

## **VANTAGE™**

**For Serial Nos.  
850,000 & Higher**  
Part No. 4500-648 Rev. D

# **Operator's Manual**

## **⚠WARNING**

### **CALIFORNIA Proposition 65 Warning**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

**Important:** The engine in this product is not equipped with a spark arrester muffler. It is a violation of California Public Resource Code (CPRC) Section 4442 to use or operate this engine on any forest-covered, brush-covered, or grass-covered land as defined in CPRC 4126. Other states or federal areas may have similar laws.

To acquire a spark arrester for your unit, see your Engine Service Dealer.

This spark ignition system complies with the Canadian standard ICES-002. Ce système d'allumage par étincelle de véhicule est conforme à la norme NMB-002 du Canada.

The enclosed Engine Owner's Manual is supplied for information regarding The U.S. Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance and warranty.

Keep this engine Owner's Manual with your unit. Should this engine Owner's Manual become damaged or illegible, replace immediately. Replacements may be ordered through the engine manufacturer.

Exmark reserves the right to make changes or add improvements to its products at any time without incurring any obligation to make such changes to products manufactured previously. Exmark, or its distributors and dealers, accept no responsibility for variations which may be evident in the actual specifications of its products and the statements and descriptions contained in this publication.



If your Exmark dealer does not have the Exmark part in stock, Exmark will get the parts to the dealer the next business day or the part will be FREE Guaranteed!! (Some restrictions apply. See your participating Exmark Dealer for details.)

# Introduction

**CONGRATULATIONS** on the purchase of your Exmark Mower. This product has been carefully designed and manufactured to give you a maximum amount of dependability and years of trouble-free operation.

This manual contains operating, maintenance, adjustment, and safety instructions for your Exmark mower.

**BEFORE OPERATING YOUR MOWER, CAREFULLY READ THIS MANUAL IN ITS ENTIRETY.**

By following the operating, maintenance, and safety instructions, you will prolong the life of your mower, maintain its maximum efficiency, and promote safe operation.

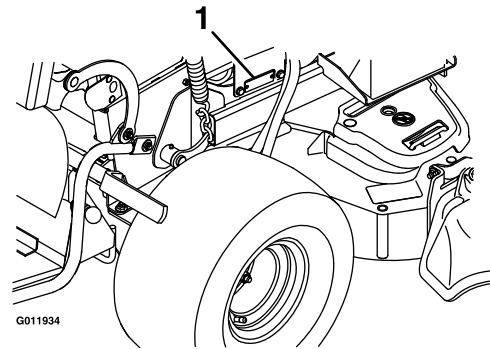
If additional information is needed, or should you require trained mechanic service, contact your authorized Exmark equipment dealer or distributor. Exmark parts manuals are available online at <http://www.exmark.com/manuals.htm>.

All Exmark equipment dealers and distributors are kept informed of the latest methods of servicing and are equipped to provide prompt and efficient service in the field or at their service stations. They carry ample stock of service parts or can secure them promptly for you from the factory.

All Exmark parts are thoroughly tested and inspected before leaving the factory, however, attention is required on your part if you are to obtain the fullest measure of satisfaction and performance.

Whenever you need service, genuine Exmark parts, or additional information, contact an Authorized Service Dealer or Exmark Customer Service and have the model and serial numbers of your product ready.

Figure 1 identifies the location of the model and serial numbers on the product. Write the numbers in the space provided.



**Figure 1**

1. Model and serial number location

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<b>Model No.</b> _____
<b>Serial No.</b> _____

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# Safety

## Safety Alert Symbol

This Safety Alert Symbol (Figure 2) is used both in this manual and on the machine to identify important safety messages which must be followed to avoid accidents.

This symbol means: **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



Figure 2

1. Safety alert symbol

The safety alert symbol appears above information which alerts you to unsafe actions or situations and will be followed by the word **DANGER**, **WARNING**, or **CAUTION**.

**DANGER:** White lettering / Red background. Indicates an imminently hazardous situation which, if not avoided, **Will** result in death or serious injury.

**WARNING:** Black lettering / Orange background. Indicates a potentially hazardous situation which, if not avoided, **Could** result in death or serious injury.

**CAUTION:** Black lettering / Yellow background. Indicates a potentially hazardous situation which, if not avoided, **May** result in minor or moderate injury.

This manual uses two other words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

## Safe Operating Practices

### Training

- Read the Operator's Manual and other training material. If the operator(s) or mechanic(s) can not read English it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner is responsible for training the users.

- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- Only adults and mature teenagers should operate a mower, and even mature teenagers should have adult supervision. Be sure a teenager:
  1. has read and understands the Operator's Manual and recognizes the risks involved;
  2. is sufficiently mature to use caution; and
  3. is of sufficient size and weight to operate the controls comfortably and to manage the mower without taking risks.
- The owner/user can prevent and is responsible for accidents or injuries occurring to himself or herself, other people or property.

### Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by Exmark.
- Wear appropriate clothing including safety glasses, substantial footwear, long trousers, and hearing protection. Do Not operate when barefoot or when wearing open sandals. Long hair, loose clothing or jewelry may get tangled in moving parts.

### **⚠ CAUTION**

**This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss through extended periods of exposure.**

**Wear hearing protection when operating this machine.**

- Inspect the area where the equipment is to be used and remove all rocks, toys, sticks, wires, bones, and other foreign objects which can be thrown by the machine and may cause personal injury to the operator or bystanders.

## **⚠ DANGER**

In certain conditions gasoline is extremely flammable and vapors are explosive.

A fire or explosion from gasoline can burn you, others, and cause property damage.

- Fill the fuel tank outdoors on level ground, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Never refill the fuel tank or drain the machine indoors or inside an enclosed trailer.
- Do Not fill the fuel tank completely full. Fill the fuel tank to the bottom of the filler neck. The empty space in the tank allows gasoline to expand. Overfilling may result in fuel leakage or damage to the engine or emission system (if equipped).
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by spark.
- Store gasoline in an approved container and keep it out of the reach of children.
- Add fuel before starting the engine. Never remove the cap of the fuel tank or add fuel when engine is running or when the engine is hot.
- If fuel is spilled, Do Not attempt to start the engine. Move away from the area of the spill and avoid creating any source of ignition until fuel vapors have dissipated.
- Do Not operate without entire exhaust system in place and in proper working condition.

## **⚠ DANGER**

In certain conditions during fueling, static electricity can be released causing a spark which can ignite gasoline vapors. A fire or explosion from gasoline can burn you and others and cause property damage.

- Always place gasoline containers on the ground away from your vehicle before filling.
- Do Not fill gasoline containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a gasoline dispenser nozzle.
- If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

## **⚠ WARNING**

Gasoline is harmful or fatal if swallowed. Long-term exposure to vapors has caused cancer in laboratory animals. Failure to use caution may cause serious injury or illness.

- Avoid prolonged breathing of vapors.
- Keep face away from nozzle and gas tank/container opening.
- Keep away from eyes and skin.
- Never siphon by mouth.

- Check that the operator's presence controls, safety switches, and shields are attached and functioning properly. Do Not operate unless they are functioning properly.

## Operation

### **WARNING**

Operating engine parts, especially the muffler, become extremely hot. Severe burns can occur on contact and debris, such as leaves, grass, brush, etc. can catch fire.

- Allow engine parts, especially the muffler, to cool before touching.
- Remove accumulated debris from muffler and engine area.
- Install and maintain in working order a spark arrester before using equipment on forest-covered, grass-covered, or brush-covered unimproved land.

### **WARNING**

Engine exhaust contains carbon monoxide, which is an odorless deadly poison that can kill you.

**Do Not run engine indoors or in a small confined area where dangerous carbon monoxide fumes can collect.**

- Operate only in daylight or good artificial light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine.
- Never raise deck with blades running.
- Never operate the mower with damaged guards, shields, or covers. Always have safety shields, guards, switches and other devices in place and in proper working condition.
- Never mow with the discharge deflector raised, removed or altered unless there is a grass collection system or mulch kit in place and working properly.
- Do Not change the engine governor setting or overspeed the engine.
- Park the machine on level ground. Stop engine, wait for all moving parts to stop, remove key and engage parking brake:
  - Before checking, cleaning or working on the mower.

- After striking a foreign object or abnormal vibration occurs (inspect the mower for damage and make repairs before restarting and operating the mower).
- Before clearing blockages.
- Whenever you leave the mower.
- Stop engine, wait for all moving parts to stop, and engage parking brake:
  - Before refueling.
  - Before dumping the grass catcher.
  - Before making height adjustments.

### **WARNING**

Hands, feet, hair, clothing, or accessories can become entangled in rotating parts. Contact with the rotating parts can cause traumatic amputation or severe lacerations.

- **Do Not operate the machine without guards, shields, and safety devices in place and working properly.**
- **Keep hands, feet, hair, jewelry, or clothing away from rotating parts.**

- **NEVER** carry passengers. **DO NOT** operate the mower when people, especially children, or pets are in the area.
- Be alert, slow down and use caution when making turns. Look behind and to the side before changing directions.
- Stop the blades, slow down, and use caution when crossing surfaces other than grass and when transporting the mower to and from the area to be mowed.
- Be aware of the mower discharge path and direct discharge away from others.
- Do Not operate the mower under the influence of alcohol or drugs.
- Use extreme care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

## Slope Operation

Use **Extreme** caution when mowing and/or turning on slopes as loss of traction and/or tip-over could

# Safety

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occur. The operator is responsible for safe operation on slopes.

## **⚠ DANGER**

**Operating on wet grass or steep slopes can cause sliding and loss of control. Loss of control and/or loss of operator's footing could result in a fall with an arm or leg getting under the mower or engine deck which may result in serious injury, death or drowning.**

- **Mow across slopes, never up and down.**
  - **Do Not mow slopes when grass is wet.**
  - **Do Not mow near drop-offs or near water.**
  - **Do Not mow slopes greater than 20 degrees.**
  - **Reduce speed and use extreme caution on slopes.**
  - **Avoid sudden turns or rapid speed changes.**
- See inside the back cover to determine the approximate slope angle of the area to be mowed.
  - Remove or mark obstacles such as rocks, tree limbs, etc. from the mowing area. Tall grass can hide obstacles.
  - Watch for ditches, holes, rocks, dips and rises that change the operating angle, as rough terrain could overturn the machine.
  - Avoid sudden starts when mowing uphill because the mower may tip backwards.
  - Be aware that operating on wet grass, across steep slopes or downhill may cause the mower to lose traction. Loss of traction to the drive wheels may result in sliding and a loss of braking and steering.
  - Always avoid sudden starting or stopping on a slope. If tires lose traction, disengage the blades and proceed slowly off the slope.
  - Follow the manufacturer's recommendations for wheel weights or counter weights to improve stability.
  - Use extreme care with grass catchers or attachments. These can change the stability of the machine and cause loss of control.

## Maintenance and Storage

- Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.
- Keep engine and engine area free from accumulation of grass, leaves, excessive grease or oil, and other debris which can accumulate in these areas. These materials can become combustible and may result in a fire.
- Let engine cool before storing and do not store near flame or any enclosed area where open pilot lights or heat appliances are present.
- Shut off fuel while storing or transporting. Do Not store fuel near flames or drain indoors.
- Park machine on level ground. Never allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect battery or remove spark plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace damaged blades. Never straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.



## ⚠ DANGER

Charging or jump starting the battery may produce explosive gases. Battery gases can explode causing serious injury.

- Keep sparks, flames, or cigarettes away from battery.
- Ventilate when charging or using battery in an enclosed space.
- Make sure venting path of battery is always open once battery is filled with acid.
- Always shield eyes and face from battery.

## ⚠ DANGER

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns. Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- Wear safety glasses to shield eyes, and rubber gloves to protect skin and clothing when handling electrolyte.
- Do Not swallow electrolyte.
- In the event of an accident, flush with water and call a doctor immediately.

## ⚠ CAUTION

If the ignition is in the “ON” position there is potential for sparks and engagement of components. Sparks could cause an explosion or moving parts could accidentally engage causing personal injury.

Be sure ignition switch is in the “OFF” position before charging the battery.

- Keep all guards, shields and all safety devices in place and in safe working condition.
- Check all bolts frequently to maintain proper tightness.
- Frequently check for worn or deteriorating components that could create a hazard.

## ⚠ WARNING

Removing standard original equipment parts, or using non-Exmark replacement parts and accessories may alter the warranty, traction, and safety of the machine. Failure to use original Exmark parts could cause serious injury or death.

Replace all parts including, but not limited to tires, belts, and blades with original Exmark parts.

## ⚠ WARNING

Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

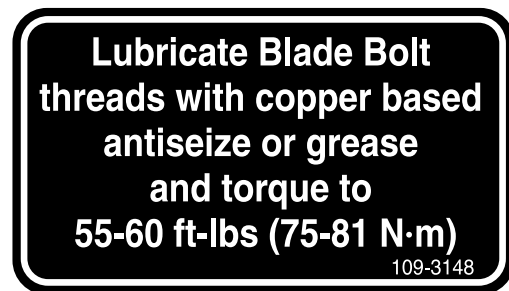
- Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.
- Keep body and hands away from pinhole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper, not your hands, to find hydraulic leaks.
- Safely relieve all pressure in the hydraulic system by placing the motion control levers in neutral and shutting off the engine before performing any work on the hydraulic system.

## Safety and Instructional Decals

- Keep all safety signs legible. Remove all grease, dirt and debris from safety signs and instructional labels.
- Replace all worn, damaged, or missing safety signs.
- When replacement components are installed, be sure that current safety signs are affixed to the replaced components.
- If an attachment or accessory has been installed, make sure current safety signs are visible.
- New safety signs may be obtained from your authorized Exmark equipment dealer or distributor or from Exmark Mfg. Co. Inc.
- Safety signs may be affixed by peeling off the backing to expose the adhesive surface. Apply only to a clean, dry surface. Smooth to remove any air bubbles.
- Familiarize yourself with the following safety signs and instruction labels. They are critical to the safe operation of your Exmark commercial mower.



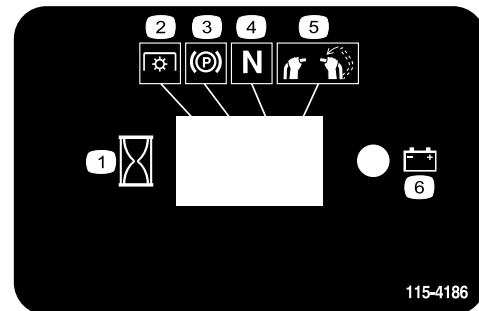
1-303508



109-3148



1-403005



115-4186

1. Interval
2. Power Take-off (PTO)
3. Parking brake
4. Neutral
5. Operator presence switch
6. Battery



98-5954

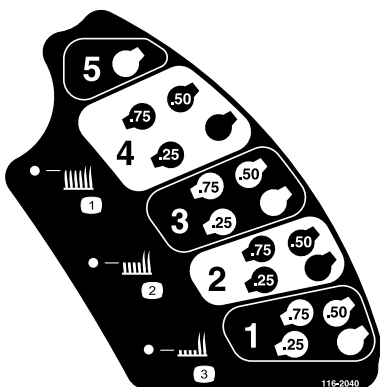


106-5517

1. Warning—Do Not touch the hot surface.



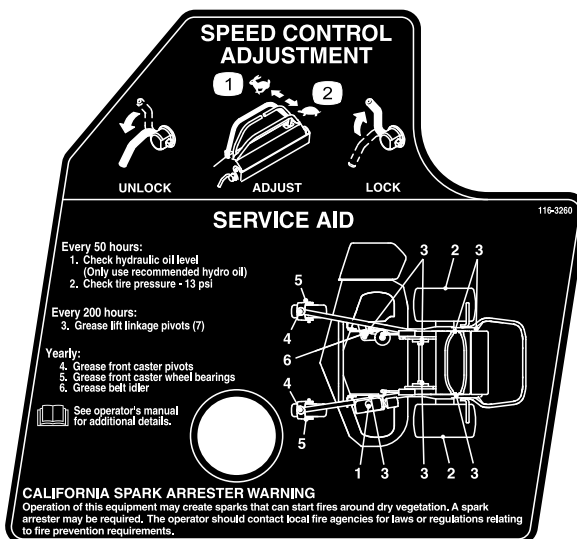
116-0404



116-2040



116-3076

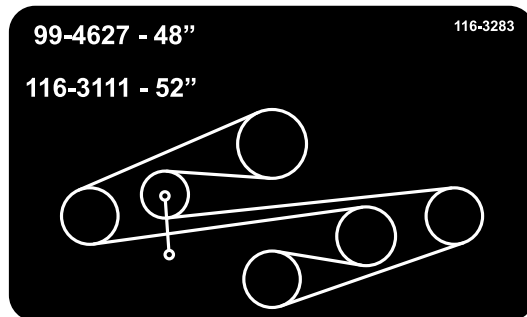


116-3260

1. Forward position - faster
2. Backward position - slower

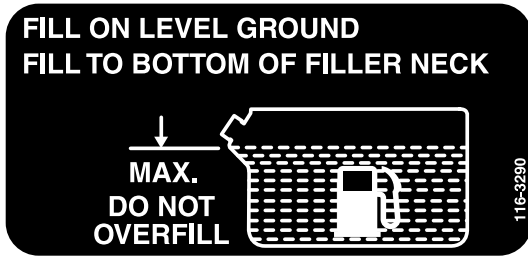


116-3267



116-3283

# Safety



116-3290

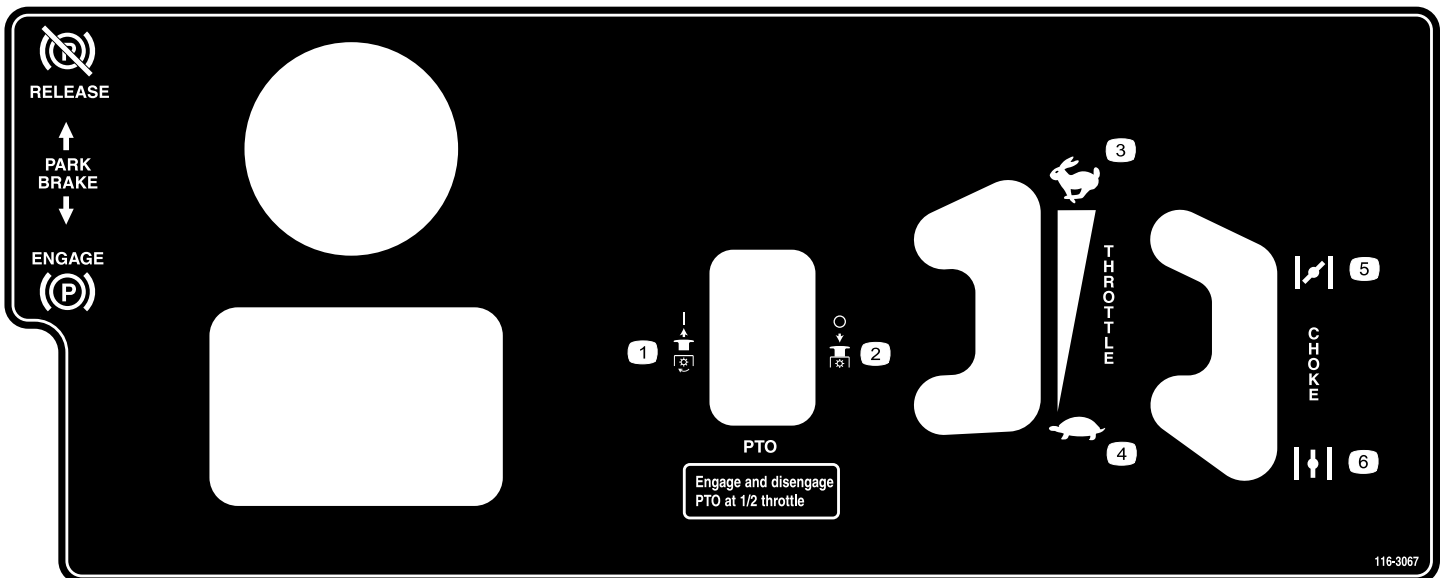


116-1886



116-1887

- |         |            |
|---------|------------|
| 1. Fast | 3. Neutral |
| 2. Slow | 4. Reverse |



116-3067

- |            |              |
|------------|--------------|
| 1. PTO-on  | 4. Slow      |
| 2. PTO-off | 5. Choke-on  |
| 3. Fast    | 6. Choke-off |

# Specifications

## Model Numbers

Serial Nos: 850,000 and Higher

VT20KAS484; VT20KAS524; VT24KAS484; VT24KAS524; VT24KAS484CA; VT24KAS524CA

## Systems

### Engine

- Engine Specifications: See your Engine Owner's Manual
- RPM: Full Speed: 3600 ±100 RPM (No Load)

### Fuel System

- Capacity: 8.0 gal. (30.2 L)
- Type of Fuel: Regular unleaded gasoline, 87 octane or higher; containing no more than 10% methanol or ethanol.
- Fuel Filter: Replaceable In-line
- Fuel Shut-Off Valve: 1/4 turn increments

### Electrical System (Electric Start)

- Charging System: Flywheel Alternator
- Charging Capacity: 15 amps
- Battery Type: BCI Group U1
- Battery Voltage: 12 Volt
- Polarity: Negative Ground
- Fuses:
  - 30 amp main fuse
  - 25 amp charging system fuse
  - 10 amp PTO fuse
  - 15 amp accessory fuse

### Safety Interlock System

- LCD indicators appear for the park brake, drive levers, and operator presence in the message display on the front control panel.

**Note:** Because the PTO must be disengaged to start the engine, the LCD indicator will not illuminate at this time.

- PTO must be disengaged and motion control levers in neutral to start engine. (It is not

necessary for the operator to be on the platform to start the engine.)

- Mower blades will stop if the right side motion control lever is moved or released into the PTO disengage position.
- Engine will stop if the motion control levers are moved from the neutral position with the park brake engaged.

### Operator Controls

Steering Control: Fingertip drive control levers provide independent speed control, braking and neutral to each drive wheel for moving forward or reverse, stopping, and power turning.

### Transmission

- Two Hydro Gear variable displacement high efficiency pumps independently coupled to two high efficiency Parker/Ross wheel drive motors.
- Hydraulic Oil: Use Exmark Premium Hydro Oil.
- Hydraulic Oil Capacity: 2.4 qt. (2.2 L)
- Hydraulic Filter is replaceable cartridge type.
  - P/N 109-4180: 25 microns, 10 psi bypass (Summer use above 32°F (0°C))
  - P/N 1-523541: 40 microns, 18 psi bypass (Winter use below 32°F (0°C))
- Speeds:
  - 0-8.0 mph (13 km/hr) forward.
  - 0-4.0 mph (6 km/hr) reverse.
- Drive wheels release valves allow machine to be moved when engine is not running.

### Wheel Drive System

Drive wheels are direct coupled to Parker wheel drive motors with 1 inch (25.4 mm) tapered shaft.

# Specifications

## Tires & Wheels

	Drive	Front Caster
	Pneumatic (Air-Filled)	Semi- Pneumatic
Quantity	2	2
Tread	Turf Master	Smooth
Size	20 x 10.00-8	11 x 4.00-5
Ply Rating	4	
Pressure	14 psi (97 kPa)	

## Cutting Deck

- Cutting Width:
  - 48 inch Deck: 48 inches (121.9 cm)
  - 52 inch Deck: 52.00 inches (132.1 cm)
- Discharge: Side
- Blade Size: (3 ea.)
  - 48 inch Deck: 16.25 inches (41.3 cm)
  - 52 inch Deck: 18.00 inches (45.7 cm)
- Blade Spindles: Solid steel spindles with 1.00 inch (25.4 mm) I.D. bearings.
- Deck Drive:
  - Electric clutch mounted on engine shaft.
  - Blades driven by one belt (w/self-tensioning idlers).
- Deck: Full floating deck is attached to support frame, removable for service. Deck design allows for bagging, mulching or side discharge.
- Deck Depth:
  - 48 inch Deck: 5.5 inches (14.0 cm)
  - 52 inch Deck: 5.5 inches (14.0 cm)
- Cutting Height Adjustment:
 

Adjusts from 1 inch (2.5 cm) to 5 inches (12.7 cm) in 1/4 inch (6.4 mm) increments
- Mulching Kit: Optional
- Bagger: Optional

## Dimensions

### Overall Width:

	48 inch Deck	52 inch Deck
Deflector Up	51.8 inches (131.6 cm)	56.3 inches (143.0 cm)
Deflector Down	59.6 inches (151.4 cm)	64.8 inches (164.6 cm)

### Overall Length:

	48 inch Deck	52 inch Deck
Platform Up	59.0 inches (150.0 cm)	59.0 inches (150.0 cm)
Platform Down	74.0 inches (188.0 cm)	74.0 inches (188.0 cm)

### Overall Height:

48 inch Deck	52 inch Deck
50.0 inches (127.0 cm)	50.0 inches (127.0 cm)

### Tread Width: (Outside to Outside of Tires, Widthwise)

48 inch Deck	52 inch Deck
46.5 inches (118.1 cm)	46.5 inches (118.1 cm)

### Curb Weight:

48 inch Deck	52 inch Deck
855 lb (388 kg)	866 lb (393 kg)

**Note:** Weights will vary slightly depending on engine.

# Torque Requirements

Bolt Location	Torque
Cutter Housing Spindle Nut	140-145 ft-lb (190-197 N-m)
Blade Mounting Bolt (lubricate with anti-seize)	55-60 ft-lb (75-81 N-m)
Engine Deck/Mower Deck Support Mount Bolts	30-35 ft-lb (41-47 N-m)
Engine Mounting Bolts	15-20 ft-lb (20-27 N-m)
Wheel Lug Nuts	90-95 ft-lb (122-129 N-m)
Wheel Hub Nuts	175-225 ft-lb (237-305 N-m)
Wheel Motor Mounting Bolts	30-35 ft-lb (41-47 N-m)

# Product Overview

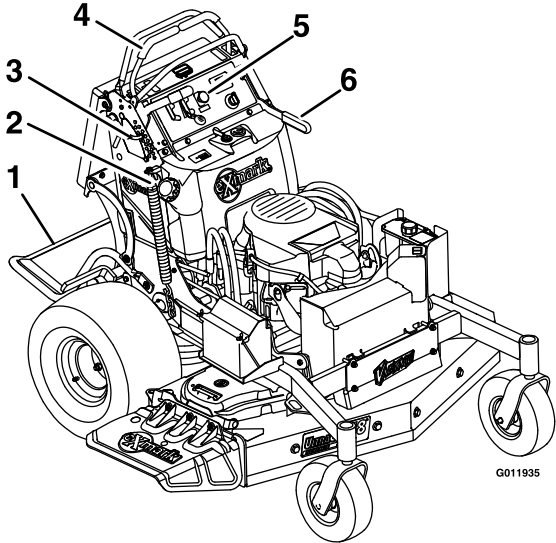


Figure 3

- 1. Platform
- 2. Fuel Cap
- 3. Height-of-Cut Adjustment
- 4. Motion control levers
- 5. Engine Controls
- 6. Park Brake Lever

# Operation

## Operation

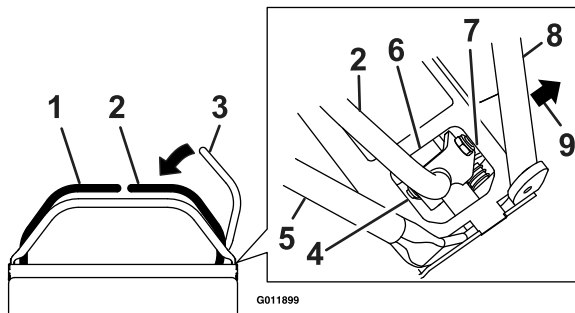
**Note:** Determine the left and right sides of the machine from the normal operating position.

## Controls

### Motion Control Levers

The motion control levers, located on each side of the top console, control the forward and reverse motion of the machine.

Moving the levers forward or backward turns the wheel on the same side forward or reverse respectively. Wheel speed is proportional to the amount the lever is moved.



**Figure 4**

- |  |                                      |
|--|--------------------------------------|
| 1. LH Motion control lever                           | 6. Neutral                           |
| 2. RH Motion control lever                           | 7. Forward                           |
| 3. RH Motion control lever in PTO disengage position | 8. Front reference/Speed control bar |
| 4. Reverse   | 9. Front of unit                     |
| 5. Rear reference bar                                |                                      |

When the motion control levers are in the neutral position, the LCD indicator appears in the message display on the front control console (see Figure 5 and Figure 7).

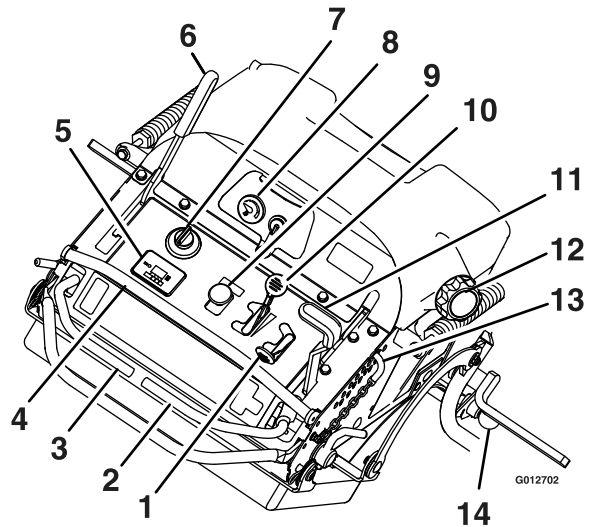
When the motion control levers are in the neutral position and the RH motion control lever is moved into the PTO disengage position, the mower blades will disengage.

### Choke Control

Located on the front control console right of the PTO engagement switch.

The choke is used to aid in starting a cold engine. Moving the choke lever forward will put the choke in the “ON” position and moving the choke lever to the

rear, to the detent, will put the choke in the “OFF” position. Do Not run a warm engine with choke in the “ON” position.



**Figure 5**

- |                                      |                          |
|--------------------------------------|--------------------------|
| 1. Throttle                          | 8. Fuel gauge            |
| 2. RH Motion control lever           | 9. PTO engagement switch |
| 3. LH Motion control lever           | 10. Choke                |
| 4. Front Reference/Speed Control Bar | 11. Deck lift handle     |
| 5. Message display                   | 12. Fuel cap             |
| 6. Park brake lever                  | 13. Height-of-cut pin    |
| 7. Ignition switch                   | 14. Platform latch       |

### Throttle Control

Located on the RH side of the front control console (red lever) (see Figure 5).

The throttle is used to control engine speed. Moving the throttle lever forward will increase engine speed and moving the throttle lever to the rear will decrease engine speed. Moving the throttle forward into the detent is full throttle.

### Front Reference/Speed Control Bar

Located in front of the motion control levers (see Figure 5).

The front reference/speed control bar controls the maximum forward speed and is infinitely variable from approximately 4–8 mph (6–13 km/hr).

### Park Brake Lever

Located on left side of unit, just to the front of the LH motion control lever (see Figure 5).



The brake lever engages a parking brake on the drive wheels.

**Note:** The LCD indicator appears in the message display on the front console when the park brake is engaged (see Figure 5 and Figure 7).

To engage the brake, pull the lever rearward and to the right to position into the engaged position.

To release, pull the brake lever back and over to the left, position into the slot and push the lever forward.

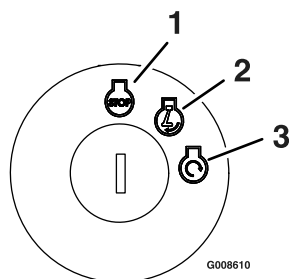
When parking on a steep slope, the wheels must be chocked or blocked in addition to the brake being engaged. The unit must be tied down and brake engaged when transporting.

Park brake must be disengaged before moving motion control out of neutral or engine will kill.

## Ignition Switch

Located on the LH side of the front control console (see Figure 5).

The ignition switch is used to start and stop the engine. The switch has three positions “OFF”, “ON” and “START”. Insert key into switch and rotate clockwise to the “ON” position. Rotate clockwise to the next position to engage the starter (key must be held against spring pressure in this position). Allow the key to return to the “ON” position immediately after the engine starts.



**Figure 6**

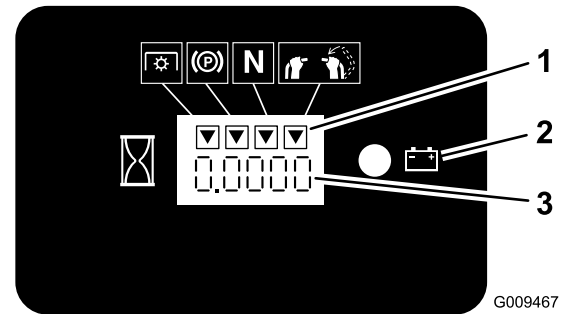
1. Off
2. On
3. Start

**Note:** To start the engine, place the LH motion control lever in neutral, the RH motion control in PTO disengage position, and the PTO switch disengaged. (It is not necessary for the operator to be on the platform.)

## Hour Meter

Located on the LH side of the front control console in the message display (see Figure 5 and Figure 7).

The hour meter records the number of hours that the engine has run.



**Figure 7**

1. LCD Indicators
2. Low voltage indicator light
3. Hour/Voltage display

The hour meter is recording when the decimal point is flashing in Hour/Voltage display.

Hours are displayed when the key is off or when the machine is running.

**Note:** If the ignition key is turned to the “ON” position for a few seconds before cranking the engine, the battery voltage will display in the area where the hours are normally displayed.

**Note:** The LCD indicators appear when each control meets the “safe to start” mode. Because the PTO must be disengaged to start the engine, the LCD indicator will not illuminate at this time.

## Fuel Shut-Off Valve

Located on the RH side of the control tower behind the knee cushion.

The fuel shut-off valve is used to shut off the fuel when the machine will not be used for a few days, during transport to and from the jobsite, and when parked inside a building.

Align valve handle with the fuel line to open. Rotate 90° to close.

## Fuel Gauge

Located on the top left side of the tank (see Figure 5).

# Operation

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The fuel gauge monitors the amount of fuel in the tank.

## Drive Wheel Release Valves

Located on the left rear corner of the hydrostatic pumps.

Drive wheel release valves are used to release the hydrostatic drive system to allow the machine to be moved by hand without the engine running.

With a 5/8 wrench, turn both valves one turn counterclockwise to release the drive system.

Turn clockwise to reset the drive system. **Do Not overtighten. Do Not tow machine.**

## PTO Engagement Switch

Located on front control panel (see Figure 5).

Switch must be pulled out (up) to engage the blades. Switch is pushed in to disengage the blades.

The LCD indicator will appear when the PTO switch is engaged (see Figure 7).

## Low Voltage Indicator

Located on the front control panel in the message display (see Figure 5 and Figure 7).

A low voltage condition (less than 12.3 volts) exists when the low voltage indicator light appears on the message display while the engine is running.

If the ignition key is turned to the “ON” position for a few seconds before cranking the engine, the battery voltage will display in the area where the hours are normally displayed.

**Note:** The indicator normally appears when the engine is off and the key switch is turned to the “ON” position.

## Deck Lift Handle

Located on the RH of the front control panel.

Pull the handle rearward to raise the cutting deck. Allow the handle to move forward to lower the cutting deck to the cut height that has been set.

Pull the handle rearward and to the right to latch the cutting deck into the raised transport position (Figure 5).

## Pre-Start

Fill fuel tank on level ground. For best results use only clean, fresh regular grade unleaded gasoline with an octane rating of 87 or higher.

**Important: Never use methanol, gasoline containing methanol, gasohol containing more than 10% ethanol, premium gasoline, or white gas because the fuel system could be damaged.**

**Do Not** add oil to gasoline.

**Do Not** use gasoline that has been stored since the last mowing season or longer.

**Do Not** overfill fuel tank. Fill the fuel tank to the bottom of the filler neck. The empty space in the tank allows gasoline to expand. Overfilling may result in fuel leakage or damage to the engine or emission system (if equipped).

Make sure you understand the controls, their locations, their functions, and their safety requirements.

Refer to the Maintenance section and perform all the necessary inspection and maintenance steps.

## Operating Instructions

### Open the Fuel Shut-Off Valve

Rotate the valve and align with the fuel line to open.

### Starting the Engine

1. Leave the LH motion control lever in neutral and the RH lever in the PTO disengage position (see Figure 4).
2. Pull the parking brake rearward and over to the right to engage the parking brake.
3. Push in (down) on the PTO switch to the “disengage” position.
4. Place the throttle midway between the “SLOW” and “FAST” positions.
5. On a cold engine, push the choke lever forward into the “ON” position.  
On a warm engine, leave the choke in the “OFF” position.
6. Turn ignition switch to the “START” position. Release the switch as soon as the engine starts.

**Important:** Do Not crank the engine continuously for more than ten seconds at a time. If the engine does not start, allow a 60 second cool-down period between starting attempts. Failure to follow these guidelines can burn out the starter motor.

7. If the choke is in the “ON” position, gradually return choke to the “OFF” position as the engine warms up.

## PTO Engagement

### **⚠ DANGER**

The rotating blades under the mower deck are dangerous. Blade contact can cause serious injury or kill you.

**Do Not put hands or feet under the mower or mower deck when the blades are engaged.**

### **⚠ DANGER**

An uncovered discharge opening will allow objects to be thrown in an operator’s or bystander’s direction. Also, contact with the blade could occur. Thrown objects or blade contact can cause serious injury or death.

**Never operate the mower with the discharge deflector raised, removed, or altered unless there is a grass collection system or mulch kit in place and working properly.**

The PTO switch engages the cutting blades. Be sure all persons are clear of mower deck and discharge area before engaging the PTO.

1. Set throttle to “MIDWAY” position.
2. Release the parking brake.
3. Move the right side motion control lever to the center, operate position.
4. Continue holding the right side motion control lever in the center, operate position and pull up on the blade control switch (PTO) and release. The clutch should engage and the mower blades begin rotating.
5. Place the throttle in the “FAST” position to begin mowing.

## Disengaging the PTO

1. Set the throttle midway between the “SLOW” and “FAST” positions.
2. Push down on the PTO switch to disengage the blades.

**Note:** The PTO will be disengaged by releasing the right side motion control lever and allowing it to spring outward to the PTO disengage position. The PTO will not re-engage when the RH motion control lever is moved out of the PTO disengage position without pulling up on the PTO switch. To fully disengage the PTO, continue to push the switch downward.

## Stopping the Engine

1. Bring the unit to a full stop.
2. Move the motion control levers to the neutral position; move the RH control lever out to the PTO disengage position.
3. Place the throttle midway between the “SLOW” and “FAST” positions.
4. Push down on the PTO switch to disengage the blades.
5. Engage the parking brake.
6. Allow the engine to run for a minimum of 15 seconds, then turn the ignition switch to the “OFF” position to stop the engine.
7. Remove the key to prevent children or other unauthorized persons from starting engine.
8. Close the fuel shut-off valve when the machine will not be in use for a few days, when transporting, or when the unit is parked inside a building.

## Driving the Machine

### **⚠ CAUTION**

**Machine can spin very rapidly by positioning one lever too much ahead of the other. Operator may lose control of the machine, which may cause damage to the machine or injury.**

- Use caution when making turns.
- Slow the machine down before making sharp turns.

# Operation

**Important:** To begin movement (forward or backward), the brake lever must be disengaged (pushed forward) before the motion control levers can be moved or the engine will stop.

When the RH motion control lever is positioned fully outward (apart), the drive system is in the PTO disengage position (Figure 8).

**Note:** The “N” LCD indicator appears when the RH lever is in the PTO disengage position.

When the RH motion control lever is moved directly inward (together) the drive system is in the neutral operate position.

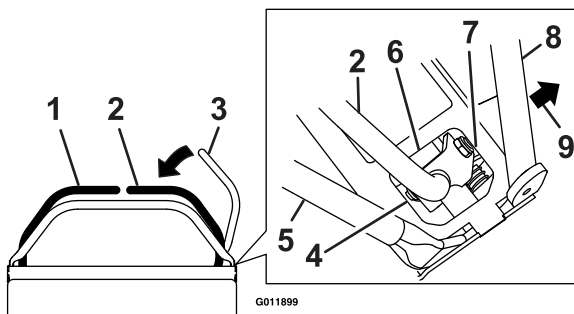


Figure 8

- |  |                                      |
|--|--------------------------------------|
| 1. LH Motion control lever                           | 6. Neutral                           |
| 2. RH Motion control lever                           | 7. Forward                           |
| 3. RH Motion control lever in PTO disengage position | 8. Front reference/Speed control bar |
| 4. Reverse   | 9. Front of unit                     |
| 5. Rear reference bar                                |                                      |

## Driving Forward

1. Make sure the motion control levers are in the neutral position.
2. Release the parking brake.
3. To move forward in a straight line, move both levers forward with equal pressure.

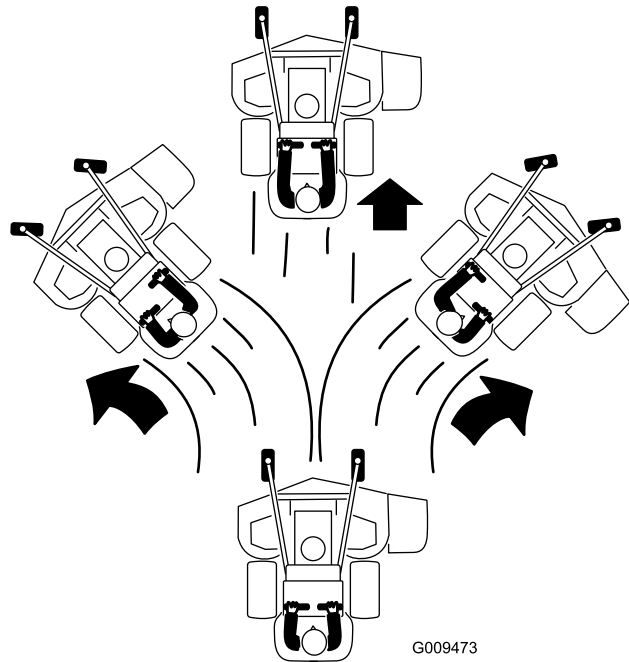


Figure 9

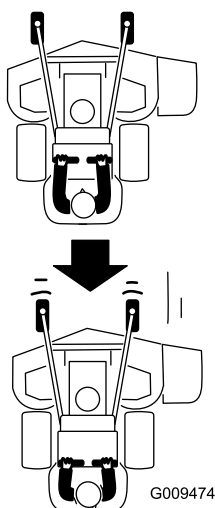
To turn left or right, pull the motion control lever back toward neutral in the desired turn direction.

The machine will move faster the farther the motion control levers are moved from the neutral position.

4. To stop, position both motion control levers in the neutral operate position.

## Driving in Reverse

1. Move the motion control levers to the neutral operate position.
2. To move rearward in a straight line, slowly move both levers rearward with equal pressure.



**Figure 10**

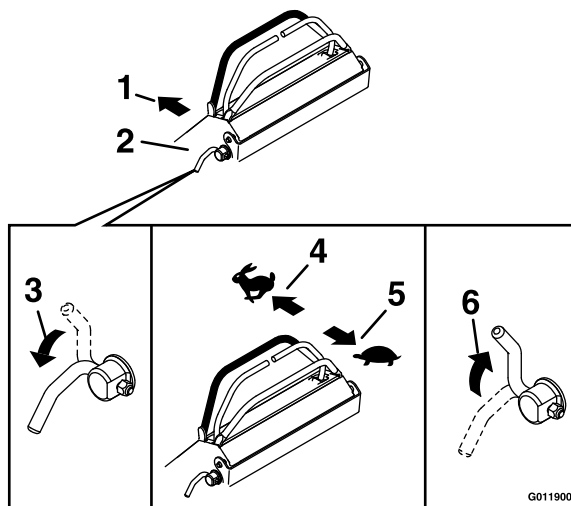
To turn left or right, release pressure on the motion control lever toward the desired turn direction.

3. To stop, position both motion control levers in the neutral operate position.

## Adjusting the Front Reference/Speed Control Bar

Adjust the front reference/speed control bar for desired maximum forward speed.

1. Stop the machine and move the motion control levers to the neutral position.
2. Disengage the PTO.
3. Unlock the handles on both sides of the control tower by pulling outward (see Figure 11).



**Figure 11**

- |                         |                               |
|-------------------------|-------------------------------|
| 1. Front of the machine | 4. Forward position — faster  |
| 2. Control tower        | 5. Backward position — slower |
| 3. Unlock               | 6. Lock                       |

4. Move the bar forward to obtain the fastest speed. Move the bar backward to obtain the slowest speed.
5. On both sides, rotate and push the handles inward to lock the handles against the control tower.

**Important:** Make sure the handles are locked in place so the front reference/speed control bar does not move during operation.

## Operating the Platform

The machine can be used with the platform in the up or down position. It is the operator's preference on which position to use.

# Operation

## ⚠ WARNING

The operator platform is heavy and may cause injury when lowering and raising the operator platform. The platform may suddenly drop if not supported when the latch pin is pulled out.

- Do Not put your hands or fingers in the platform pivot area when lowering or raising the operator platform.
- Make sure the platform is supported when the latch pin is pulled out.
- Make sure the latch secures the platform when folding it in the up position. Push it tight against the cushion for the latch pin to lock into place.

## Operating the Machine with the Platform Up

Operating the machine with the platform up is recommended when:

- Mowing near drop-off's
- Mowing small areas where the machine is too long
- Areas with low over hanging branches or obstacles
- Loading the machine for transport
- Unloading the machine after transport
- Driving up or backing down slopes or ramps.
- Turning in tight areas where platform may contact obstacles.

To raise the platform, pull the bottom upward and push it tight against the cushion. The latch pin knob will snap inward to lock the platform into place (see Figure 12).

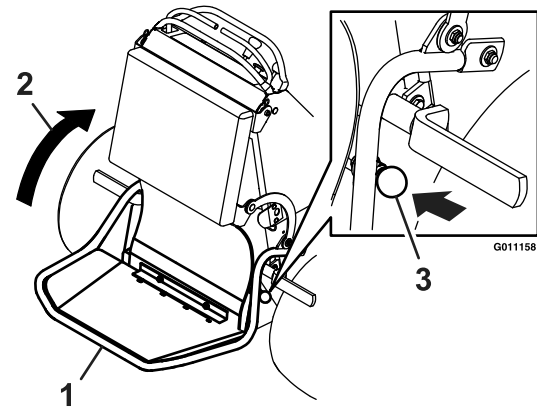


Figure 12

1. Platform
2. Raise upward
3. Latch pin knob snaps inward

## Operating the Machine with the Platform Down

Operating the machine with the platform down is recommended when:

- Mowing most areas
- Driving down slopes

To lower the platform, push the platform forward against the cushion to release pressure on the latch pin, pull the knob outward, and lower the platform (see Figure 13).

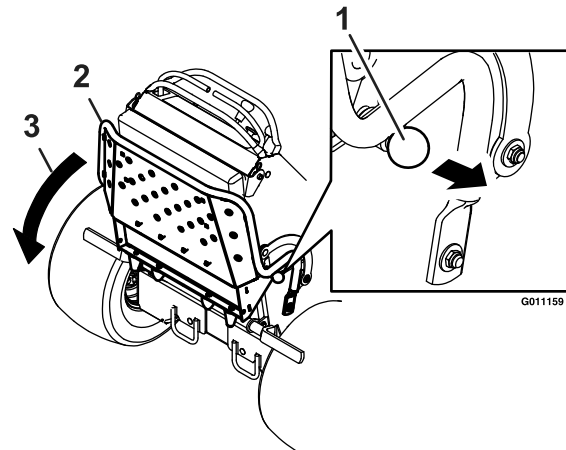


Figure 13

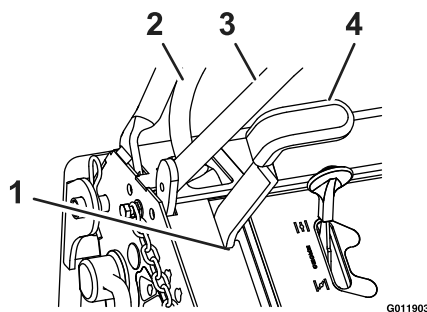
1. Pull latch pin knob outward
2. Platform
3. Lower

## Adjusting the Cutting Height

The cutting height of the mower deck is adjusted from 1 to 5 inches (2.5 cm to 12.7 cm) in 1/4 inch (6.4 mm) increments.

1. Stop the machine and move the motion control levers to the neutral position.
2. Disengage the PTO.
3. Raise and lock the deck to the 5 inch (12.7 cm) transport position.

The deck is raised by pulling the deck lift handle rearward and to the right to place it into the transport lock position.

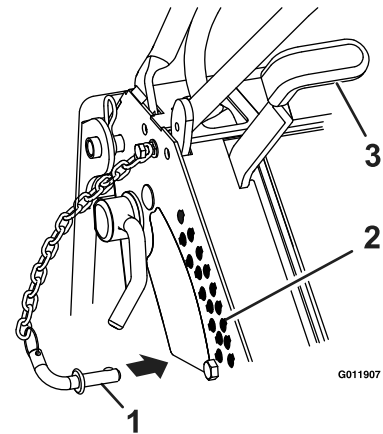


**Figure 14**

- |                            |                                      |
|----------------------------|--------------------------------------|
| 1. Transport lock position | 3. Front reference/speed control bar |
| 2. RH Motion control lever | 4. Deck lift handle                  |

**Note:** When changing the cutting height positions, always come to a complete stop and disengage the PTO.

4. Insert the height adjustment pin into the hole corresponding to the desired cutting height.  
See the decal on the side of the deck lift plate for cut heights (reference Figure 15).
5. Pull the deck lift handle rearward and to the left and slowly allow the deck to lower to the cutting height.



**Figure 15**

- |                          |                     |
|--------------------------|---------------------|
| 1. Height adjustment pin | 3. Deck lift handle |
| 2. Height of cut holes   |                     |

## Transporting

### Transporting a Unit

Use a heavy-duty trailer or truck to transport the machine. Lock brake and block wheels. Securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes. Be sure that the trailer or truck has all necessary lighting and marking as required by law. Secure a trailer with a safety chain.

## ⚠ CAUTION

This unit does not have proper turn signals, lights, reflective markings, or a slow moving vehicle emblem. Driving on a street or roadway without such equipment is dangerous and can lead to accidents causing personal injury. Driving on a street or roadway without such equipment may also be a violation of State laws and the operator may be subject to traffic tickets and/or fines.

**Do Not** drive a unit on a public street or roadway.

## **⚠ WARNING**

**Loading a unit on a trailer or truck increases the possibility of backward tip-over. Backward tip-over could cause serious injury or death.**

- **Use extreme caution when operating a unit on a ramp.**
- **Use only a single, full width ramp; Do Not use individual ramps for each side of the unit.**
- **If individual ramps must be used, use enough ramps to create an unbroken ramp surface wider than the unit.**
- **Do Not exceed a 15° angle between ramp and ground or between ramp and trailer or truck.**
- **Avoid sudden acceleration while driving unit up a ramp to avoid tipping backward.**
- **Avoid sudden deceleration while backing unit down a ramp to avoid tipping backward.**

Avoid sudden acceleration when driving up a ramp and sudden deceleration when backing down a ramp. Both maneuvers can cause the unit to tip backward.

## **Loading a Unit**

Use extreme caution when loading units on trailers or trucks. One full width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the unit. With the platform up, a full width ramp provides a surface to walk on behind the unit. If it is not possible to use one full width ramp, use enough individual ramps to simulate a full width continuous ramp.

Ramp should be long enough so that the angles between the ramp and the ground and the ramp and the trailer or truck do not exceed 15°. A steeper angle may cause mower deck components to get caught as the unit moves from ramp to trailer or truck. Steeper angles may also cause the unit to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

**Important: Do Not attempt to turn the unit while on the ramp, you may lose control and drive off the side.**



# Maintenance

**Note:** Determine the left and right sides of the machine from the normal operating position.

## ⚠ WARNING

While maintenance or adjustments are being made, someone could start the engine. Accidental starting of the engine could seriously injure you or other bystanders.

Remove the key from the ignition switch, engage parking brake, and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

## ⚠ WARNING

The engine can become very hot. Touching a hot engine can cause severe burns.

Allow the engine to cool completely before service or making repairs around the engine area.

## Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 5 hours	<ul style="list-style-type: none"> <li>• Change the engine oil.</li> </ul>
After the first 100 hours	<ul style="list-style-type: none"> <li>• Check the wheel hub torque specification.</li> <li>• Check the wheel lug nuts.</li> </ul>
After the first 250 hours	<ul style="list-style-type: none"> <li>• Change the hydraulic filter and fluid.</li> </ul>
Before each use or daily	<ul style="list-style-type: none"> <li>• Check the engine oil level.</li> <li>• Check the mower blades.</li> <li>• Check the safety interlock system.</li> <li>• Check for loose hardware.</li> <li>• Clean the engine and exhaust system area.</li> <li>• Clean the grass and debris build-up from the machine and cutting deck.</li> <li>• Clean the grass build-up from under the deck.</li> </ul>
Every 40 hours	<ul style="list-style-type: none"> <li>• Check the hydraulic oil level.</li> <li>• Check the tire pressures.</li> <li>• Check the condition of the belts.</li> </ul>
Every 50 hours	<ul style="list-style-type: none"> <li>• Check spark arrester (if equipped).</li> </ul>
Every 80 hours	<ul style="list-style-type: none"> <li>• Remove engine shrouds and clean cooling fins.</li> </ul>
Every 100 hours	<ul style="list-style-type: none"> <li>• Change the engine oil. (May need more often under severe conditions.)</li> <li>• Check the electric clutch.</li> </ul>
Every 160 hours	<ul style="list-style-type: none"> <li>• Check the spark plugs.</li> </ul>
Every 200 hours	<ul style="list-style-type: none"> <li>• Grease the lift linkage pivots.</li> </ul>
Every 250 hours	<ul style="list-style-type: none"> <li>• Replace the primary air cleaner element — check secondary air cleaner element; replace if dirty. (May need more often under severe conditions. See the Engine Owner's Manual for additional information.)</li> </ul>

# Maintenance

Maintenance Service Interval	Maintenance Procedure
Every 500 hours	<ul style="list-style-type: none"> <li>• Replace the secondary air cleaner element (May need more often under severe conditions. See the Engine Owner's Manual for additional information.)</li> <li>• Change the hydraulic filter and fluid (Every 250 hours/yearly if using Mobil 1 15W50)</li> <li>• Check the wheel hub torque specification.</li> <li>• Check the wheel lug nuts.</li> </ul>
Monthly	<ul style="list-style-type: none"> <li>• Check the battery charge.</li> </ul>
Yearly	<ul style="list-style-type: none"> <li>• Grease the front caster pivots.</li> <li>• Grease the deck belt idler pivot.</li> <li>• Grease the front caster wheel hubs.</li> </ul>

## Periodic Maintenance

### Check Engine Oil Level

#### Service Interval: Before each use or daily

1. Stop engine and wait for all moving parts to stop. Make sure unit is on a level surface.
2. Check with engine cold.
3. Clean area around dipstick. Remove dipstick and wipe oil off. Reinsert the dipstick and push it all the way down into the tube. **Do Not** screw into place. Remove the dipstick and read the oil level.
4. If the oil level is low, wipe off the area around the oil fill cap, remove cap and fill to the "FULL" mark on the dipstick. Use oil as specified in Engine Owner's Manual. **Do Not** overfill.

**Important:** Do Not operate the engine with the oil level below the "LOW" (or "ADD") mark on the dipstick, or over the "FULL" mark.

### Check Battery Charge

#### Service Interval: Monthly

**⚠ WARNING**

**CALIFORNIA**  
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Allowing batteries to stand for an extended period of time without recharging them will result in reduced performance and service life. To preserve optimum battery performance and life, recharge batteries in storage when the open circuit voltage drops to 12.4 volts.

**Note:** To prevent damage due to freezing, battery should be fully charged before putting away for winter storage.

Check the voltage of the battery with a digital voltmeter. Locate the voltage reading of the battery in the table and charge the battery for the recommended time interval to bring the charge up to a full charge of 12.6 volts or greater.

**Important:** Make sure the negative battery cables are disconnected and the battery charger used for charging the battery has an output of 16 volts and 7 amps or less to avoid damaging the battery (see chart for recommended charger settings).

Voltage Reading	Percent Charge	Maximum Charger Settings	Charging Interval
12.6 or greater	100%	16 volts/7 amps	No Charging Required
12.4 – 12.6	75–100%	16 volts/7 amps	30 Minutes
12.2 – 12.4	50–75%	16 volts/7 amps	1 Hour
12.0–12.2	25–50%	14.4 volts/4 amps	2 Hours

Voltage Reading	Percent Charge	Maximum Charger Settings	Charging Interval
11.7–12.0	0–25%	14.4 volts/4 amps	3 Hours
11.7 or less	0%	14.4 volts/2 amps	6 Hours or More

## Recommended Jump Starting Procedure

### Service Interval: As required

1. Check the weak battery for terminal corrosion (white, green, or blue “snow”), it must be cleaned off prior to jump starting. Clean and tighten connections as necessary.

### ⚠ CAUTION

Corrosion or loose connections can cause unwanted electrical voltage spikes at anytime during the jump starting procedure.

**Do Not attempt to jump start with loose or corroded battery terminals or damage to the engine may occur.**

### ⚠ DANGER

**Jump starting a weak battery that is cracked, frozen, has low electrolyte level, or an open/shorted battery cell, can cause an explosion resulting in serious personal injury.**

**Do Not jump start a weak battery if these conditions exist.**

2. Make sure the booster is a good and fully charged lead acid battery at 12.6 volts or greater. Use properly sized jumper cables (4 to 6 AWG) with short lengths to reduce voltage drop between systems. Make sure the cables are color coded or labeled for the correct polarity.

### ⚠ CAUTION

**Connecting the jumper cables incorrectly (wrong polarity) can immediately damage the electrical system.**

**Be certain of battery terminal polarity and jumper cable polarity when hooking up batteries.**

**Note:** The following instructions are adapted from the SAE J1494 Rev. Dec. 2001 – Battery Booster Cables – Surface Vehicle Recommended Practice (SAE – Society of Automotive Engineers).

### ⚠ WARNING

**Batteries contain acid and produce explosive gases.**

- Shield the eyes and face from the batteries at all times.
- Do Not lean over the batteries.

**Note:** Be sure the vent caps are tight and level. Place a damp cloth, if available, over any vent caps on both batteries. Be sure the vehicles do not touch and that both electrical systems are off and at the same rated system voltage. These instructions are for negative ground systems only.

3. Connect the positive (+) cable to the positive (+) terminal of the discharged battery that is wired to the starter or solenoid as shown in Figure 16.

# Maintenance

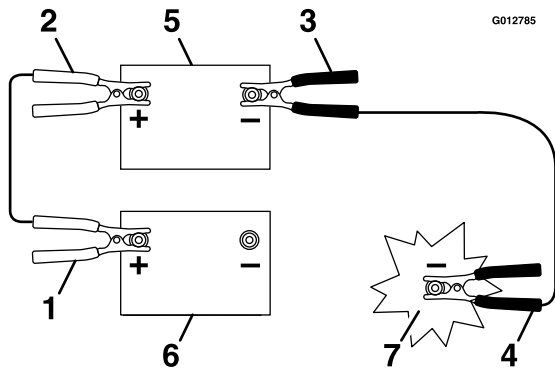


Figure 16

1. Positive (+) cable on discharged battery
2. Positive (+) cable on booster battery
3. Negative (-) cable on the booster battery
4. Negative (-) cable on the engine block
5. Booster battery
6. Discharged battery
7. Engine block

4. Connect the other end of the positive cable to the positive terminal of the booster battery.
5. Connect the black negative (-) cable to the other terminal (negative) of the booster battery.
6. MAKE THE FINAL CONNECTION ON THE ENGINE BLOCK OF THE STALLED VEHICLE (NOT TO THE NEGATIVE POST) AWAY FROM THE BATTERY. STAND BACK.
7. Start the vehicle and remove the cables in the reverse order of connection (the engine block (black) connection is the first to disconnect).

## Release the Cushion for Rear Access

**Service Interval: As required**

The cushion can be released for rear access to the machine for maintenance or adjustment.

1. Lower the platform.
2. Remove the hairpin cotter pins on each side of the cushion.
3. Push the plastic slides to the inside.
4. Remove the cushion and lower it to the platform.
5. Perform any maintenance or adjustment on the machine.

6. Raise the cushion and slide it onto the pins on both sides of the machine (Figure 17).
7. Push the plastic slides into the cushion bracket and secure them with a hairpin.

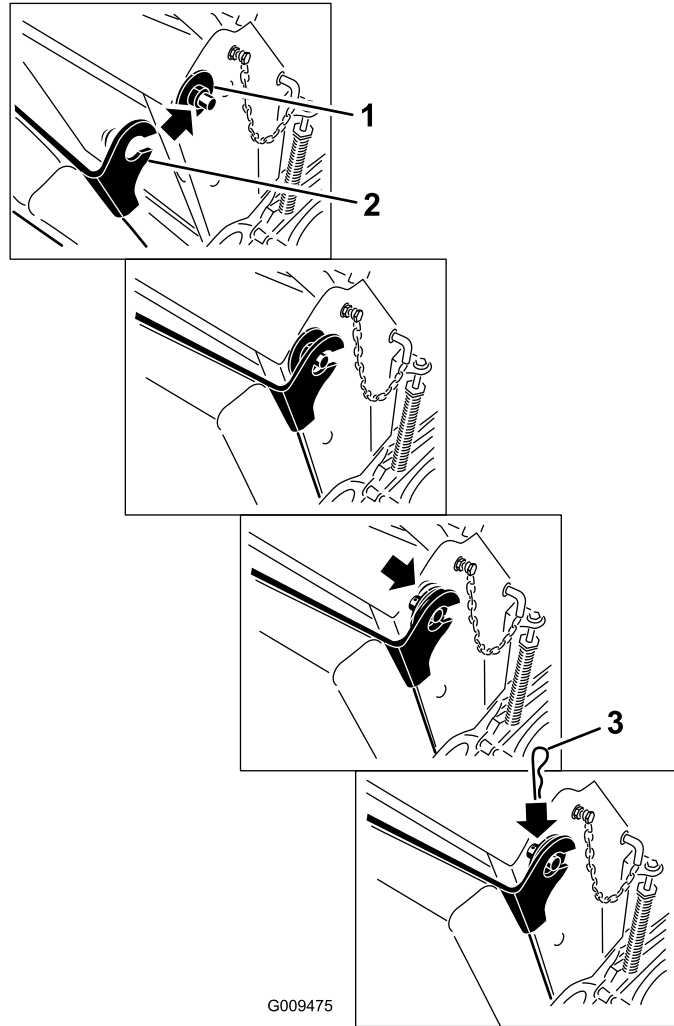


Figure 17

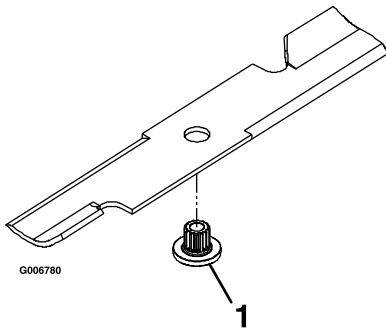
1. Plastic slide
2. Cushion bracket with key hole
3. Hairpin

## Check Mower Blades

**Service Interval: Before each use or daily**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Lift deck and secure in raised position as stated in the **Clean Grass Build-Up Under Deck** section.
3. Inspect blades and sharpen or replace as required.
4. Reinstall the blades (if they were removed) in the following order:

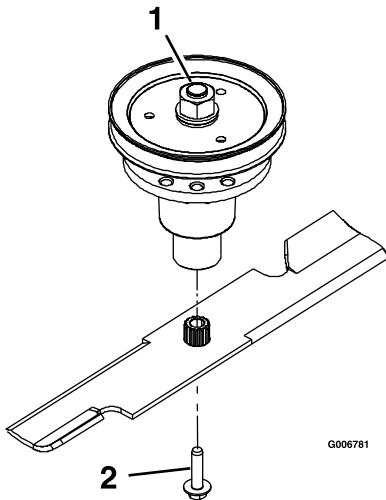
- A. Install bushing through blade with bushing flange on bottom (grass) side of blade.



**Figure 18**

1. Install bushing in blade prior to installing bushing in spindle.

- B. Install bushing/blade assembly into spindle.



**Figure 19**

1. Use wrench here for blade installation. This nut has been torqued to 140–145 ft-lb (190–197 N-m)
2. Torque to 55-60 ft-lb (75-81 N-m) Apply lubricant to threads as needed to prevent seizing. Copper-based anti-seize preferable. Grease acceptable substitute.

- C. Apply lubricant to threads of blade bolt as needed to prevent seizing. Copper-based anti-seize preferable. Grease acceptable substitute. Install blade bolt finger tight. Place wrench on the top spindle nut then torque the blade bolts to 55-60 ft-lb (75-81 N-m).

## ⚠ WARNING

Incorrect installation of the blade or components used to retain the blade can be dangerous. Failure to use all original components and assembled as shown could allow a blade or blade component to be thrown out from under the deck resulting in serious personal injury or death.

Always install the original Exmark blades, blade bushings, and blade bolts as shown.

## Check Safety Interlock System

**Service Interval: Before each use or daily**

## ⚠ CAUTION

If safety interlock switches are disconnected or damaged the machine could operate unexpectedly causing personal injury.

- Do not tamper with the interlock switches.
- Check the operation of the interlock switches daily and replace any damaged switches before operating the machine.

### Understanding the Safety Interlock System

The safety interlock system is designed to prevent the mower blades from rotating unless:

- The right side motion control lever is moved to the center, operating position.
- The blade control switch (PTO) is pulled **on**.

The safety interlock system is designed to stop the mower blades if you move or release the right side motion control lever into the PTO disengage position.

- The right side motion control lever is moved to the center, operating position, the parking brake is engaged, and the blade control switch (PTO) is pulled **on**.

### Checking the Safety Interlock System

1. Start the engine.
2. Set the parking brake.

# Maintenance

---

3. Move the motion control levers forward.  
**The engine should initiate shutdown after momentary pause.**
4. Start the engine and release the parking brake.
5. Move the right side motion control lever to the center, operating position.
6. Continue holding the right side motion control lever in the center, operating position and pull up on the blade control switch (PTO) and release. The clutch should engage and the mower blades begin rotating.
7. Move or release the right side motion control lever into the neutral position. **The blades should stop rotating and the engine should continue running.**
8. Push the blade control switch down and move the right side motion control lever to the center, operating position.
9. Continue holding the right side motion control lever in the center, operating position and pull up on the blade control switch (PTO) and release. The clutch should engage and the mower blades begin rotating.
10. Push the blade control switch (PTO) down to the off position. **The blades should stop rotating.**
11. With the engine running, pull up the blade control switch (PTO) and release without holding right side motion control lever to the center, operating position. **The blades should not rotate.**

## Check for Loose Hardware

**Service Interval: Before each use or daily**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Visually inspect machine for any loose hardware or any other possible problem. Tighten hardware or correct the problem before operating.

## Service Air Cleaner

**Service Interval: Every 250 hours—Replace the primary air cleaner element — check secondary air cleaner element; replace if dirty. (May need more often under severe conditions. See the Engine Owner’s**

**Manual for additional information.)**

**Every 500 hours—Replace the secondary air cleaner element (May need more often under severe conditions. See the Engine Owner’s Manual for additional information.)**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. See the Engine Owner’s Manual for maintenance instructions.

## Change Engine Oil

**Service Interval: After the first 5 hours**

**Every 100 hours (May need more often under severe conditions.)**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Drain oil while engine is warm from operation.
3. The oil drain hose assembly is located on the left side of the engine.

Place pan under machine to catch oil. Remove oil drain plug. Allow oil to drain and replace oil drain plug. Torque plug to 20-24 ft-lb (27-33 N-m).

4. Replace the oil filter per the Engine Owner’s Manual. Clean around the oil filter and carefully remove the filter by unscrewing it. Make sure no oil drains onto the belt drive or clutch through the holes in the engine deck. Before the new filter is installed, apply a thin coating of oil on the surface of the rubber seal. Turn filter clockwise until rubber seal contacts the filter adapter, then tighten filter an additional 2/3 to 3/4 turn.
5. Clean around oil fill cap and remove cap. Fill to specified capacity and replace cap.
6. Use oil recommended in engine owner’s manual. **Do Not** overfill. Start the engine and check for leaks. Stop engine and recheck oil level.
7. Wipe up any spilled oil from engine deck mounting surfaces.

## Check Hydraulic Oil Level

**Service Interval: Every 40 hours**

1. Stop engine and wait for all moving parts to stop. Engage parking brake.
2. Clean area around hydraulic reservoir cap and remove cap. Oil level should be to the top of the baffle inside the tank. If not, add oil. Use Exmark Premium Hydro oil. Replace hydraulic reservoir cap and tighten until snug. Do Not overtighten.

**Note:** The baffle is labeled “HOT” and “COLD”. The oil level varies with the temperature of the oil. The “HOT” level shows the level of oil when it is at 225°F (107°C). The “COLD” level shows the level of the oil when it is at 75°F (24°C). Fill to the appropriate level depending upon the temperature of the oil. For example: If the oil is about 150°F (65°C), fill to halfway between the “HOT” and “COLD” levels. If the oil is at room temperature (about 75°F (24°C)), fill only to the “COLD” level.

## Check Tire Pressures

**Service Interval: Every 40 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Check tire pressure in drive tires.
3. Inflate drive tires to 12–16 psi (83–110 kPa).
4. Semi-pneumatic caster tires do not need to be inflated.

## Check Condition Of Belts

**Service Interval: Every 40 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove the mower deck belt shield to check mower blade drive belt condition.
3. Look under engine deck to check the pump drive belt condition.
4. Check all idler arms to be sure they pivot freely.

## Lubricate Grease Fittings

**Note:** See chart for service intervals.

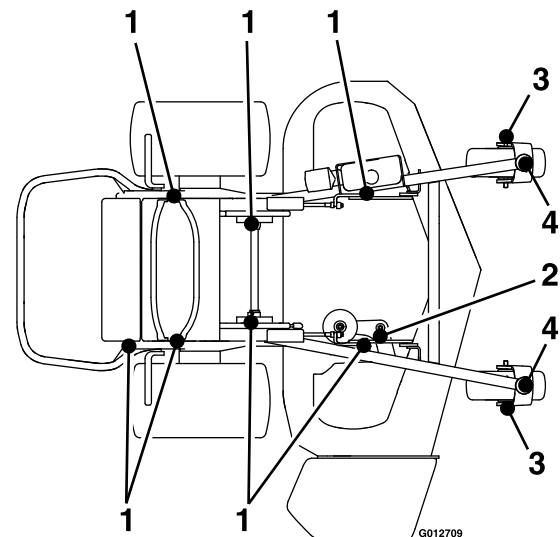
1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.

2. Lubricate fittings with NGLI grade #2 multi-purpose gun grease.

Refer to the following chart for fitting locations and lubrication schedule.

### Lubrication Chart

Fitting Locations	Initial Pumps	Number of Places	Service Interval
1. Lift Linkage Pivots	1–2	7	Every 200 hours
2. Deck Belt Idler Pivot	1	1	Yearly
3. Front Caster Wheel Hubs	*0	2	*Yearly
4. Front Caster Pivots	*0	2	*Yearly



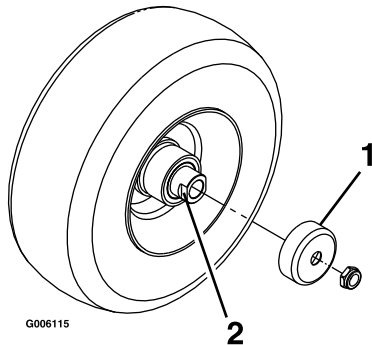
\* See step 3 for special lubrication instructions on the front caster pivots.

3. Lubricate front caster pivots once a year. Remove hex plug and cap. Thread grease zerk in hole and pump with grease until it oozes out around top bearing. Remove grease zerk and thread plug back in. Place cap back on.

## Lubricate Caster Wheel Hubs

**Service Interval: Yearly**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.



**Figure 20**

1. Seal guard
2. Spacer nut with wrench flats

2. Remove caster wheel from caster forks.
3. Remove seal guards from the wheel hub.
4. Remove one of the spacer nuts from the axle assembly in the caster wheel. Note that thread locking adhesive has been applied to lock the spacer nuts to the axle. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
5. Pry out seals, and inspect bearings for wear or damage and replace if necessary.
6. Pack the bearings with a NGLI grade #1 multi-purpose grease.
7. Insert one bearing, one new seal into the wheel.
 

**Note:** Seals (Exmark P/N 103-0063) must be replaced.
8. If the axle assembly has had both spacer nuts removed (or broken loose), apply a thread locking adhesive to one spacer nut and thread onto the axle with the wrench flats facing outward. Do Not thread spacer nut all of the way onto the end of the axle. Leave approximately 1/8 inch (3 mm) from the outer surface of the spacer nut to the end of the axle inside the nut.
9. Insert the assembled nut and axle into the wheel on the side of the wheel with the new seal and bearing.
10. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of NGLI grade #1 multi-purpose grease.
11. Insert the second bearing and new seal into the wheel.
12. Apply a thread locking adhesive to the 2nd spacer nut and thread onto the axle with the wrench flats facing outward.

13. Torque the nut to 75-80 in-lb (8-9 N-m), loosen, then re-torque to 20-25 in-lb (2-3 N-m). Make sure axle does not extend beyond either nut.
14. Reinstall the seal guards over the wheel hub and insert wheel into caster fork. Reinstall caster bolt and tighten nut fully.

**Important:** To prevent seal and bearing damage, check the bearing adjustment often. Spin the caster tire. The tire should not spin freely (more than 1 or 2 revolutions) or have any side play. If the wheel spins freely, adjust torque on spacer nut until there is a slight amount of drag. Reapply thread locking adhesive.

## Check Spark Plugs

**Service Interval: Every 160 hours**

Remove spark plugs, check condition and reset gaps, or replace with new plugs. See Engine Owner's Manual.

## Change Fuel Filter

**Service Interval: As required**

A fuel filter is installed in the fuel line between the fuel tank and the engine. Replace when necessary.

Replacement Filters	
Kawasaki	Kawasaki P/N 49019-7005

## Change Hydraulic System Filter and Fluid

**Service Interval: After the first 250 hours**

**Every 500 hours/Yearly (whichever comes first) thereafter (Every 250 hours/Yearly if using Mobil 1 15W50)**

**Note:** Use only Exmark Part No. 109-4180 for Summer use above 32°F (0°C) or P/N 1-523541 for Winter use below 32°F (0°C) (Refer to **Transmission** section in Specifications for filter specifications).

1. Stop engine, wait for all moving parts to stop, and remove key or spark plug wire(s). Engage parking brake.



- Carefully clean area around filter. It is important that no dirt or contamination enter hydraulic system.
- Unscrew filter to remove and allow oil to drain from reservoir.

**Important:** Before reinstalling new filter, fill it with Exmark Premium Hydro oil and apply a thin coat of oil on the surface of the rubber seal.

Turn filter clockwise until rubber seal contacts the filter adapter, then tighten the filter an additional 2/3 to 3/4 turn.

- Fill reservoir as stated in **Check Hydraulic Oil Level**.

Exmark Premium Hydro Oil is recommended. Refer to the chart for an acceptable alternative:

Hydro Oil	Change Interval
Exmark Premium Hydro Oil (Preferred)	500 Hours
Mobil 1 15W50	250 Hours

- Loosen filter 1/2 turn and allow a small amount of oil to leak from the oil filter (this allows air to be purged from the oil filter and supply hose from the hydraulic reservoir). Turn filter clockwise until rubber seal contacts the filter adapter. Then tighten the filter an additional 2/3 to 3/4 turn.
- Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.

## ⚠ CAUTION

Raising the mower deck for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the unit to fall, which could cause injury.

Do Not rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.

- If either drive wheel does not rotate, one or both of the charge pumps (located on the top of the main pump as shown in Figure 21) may have lost their “prime”. Refer to **Hydraulic System Air Purge** section.

**Note:** Do Not change hydraulic system oil (except for what can be drained when changing filter), unless it is felt the oil has been contaminated or been extremely hot.

Changing oil unnecessarily could damage hydraulic system by introducing contaminants into the system.

## Hydraulic System Air Purge

**Service Interval: As required**

Air must be purged from the hydraulic system when any hydraulic components, including oil filter, are removed or any of the hydraulic lines are disconnected.

The critical area for purging air from the hydraulic system is between the oil reservoir and each charge pump located on the top of each variable displacement pump (Figure 21). Air in other parts of the hydraulic system will be purged through normal operation once the charge pump is “primed”.

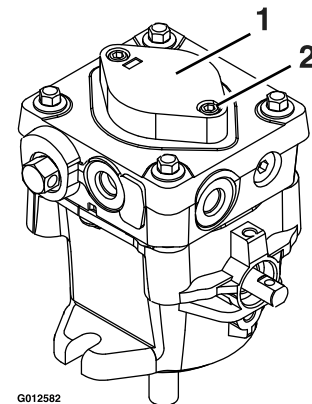


Figure 21

- Charge pump cap
- Loosen 1 1/2 turns only

- Stop engine and wait for all moving parts to stop. Raise the rear of the machine up onto jack stands high enough to raise the drive wheels off the ground.
- Check oil level as stated in **Check Hydraulic Oil Level** section.
- Start engine and move throttle control ahead to full throttle position. Move RH motion control lever inward (together) and move both levers forward with equal pressure.

If either drive wheel does not rotate, it is possible to assist the purging of the charge pump by carefully rotating the tire in the forward position.

# Maintenance

**Note:** It is necessary to lightly touch the charge pump cap with your hand to check the pump temperature. If the cap is too hot to touch, turn off engine. The pumps may be damaged if the pump becomes too hot.

If either drive wheel still does not rotate continue with step 4.

4. Thoroughly clean the area around each of the charge pump housings.
5. To “prime” charge pump, loosen two hex socket head capscrews (shown in Figure 21) **1 1/2 turns only. Make sure engine is not running.** Lift the charge pump housing upward and wait for a steady flow of oil to flow out from under the housing. Retighten the capscrews. Do this for both pumps.

**Note:** Hydraulic reservoir can be pressurized up to 5 psi to speed this process.

6. If either drive wheel still does not rotate, stop and repeat steps 4 and 5 above for the respective pump. If wheels rotate slowly, the system may prime after additional running. Check oil level as stated in **Check the Hydraulic Oil Level** section.
7. Allow unit to run several minutes after the charge pumps are “primed” with drive system in the full speed position. Check oil level as stated in **Check the Hydraulic Oil Level** section.
8. Check hydro drive linkage adjustment as stated in **Hydro Drive Linkage Adjustment** section in Adjustments.

## Wheel Hub Nut Torque Specification

**Service Interval: After the first 100 hours  
Every 500 hours thereafter**

Torque the nut on the wheel motor tapered shaft to 175-225 ft-lb (237-305 N-m).

**Note:** Do **Not** use anti-seize compound on the wheel hub.

## Check Spark Arrester (if equipped)

**Service Interval: Every 50 hours**

## ⚠ WARNING

**Hot exhaust system components may ignite gasoline vapors even after the engine is stopped. Hot particles exhausted during engine operation may ignite flammable materials. Fire may result in personal injury or property damage.**

**Do Not refuel or run engine unless spark arrester is installed.**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Wait for muffler to cool.
3. If any breaks in the screen or welds are observed, replace arrester.
4. If plugging of the screen is observed, remove arrester and shake loose particles out of the arrester and clean screen with a wire brush (soak in solvent if necessary). Reinstall arrester on exhaust outlet.

## Thread Locking Adhesives

Thread locking adhesives such as “Loctite 242” or “Fel-Pro, Pro-Lock Nut Type” are used on the following fasteners:

- Pump sheave setscrews.
- Sheave retaining bolt in end of engine crankshaft.
- Caster wheel spacer nuts.

## Mobil HTS Grease (Or Food-Grade Anti-seize)

Mobil HTS grease (or food-grade anti-seize) is used in the following locations:

- Between the cutter housing spindle and bearings.
- Between the cutter housing spindle and sheave.
- Under top cutter housing bearing guard.

## Copper-Based Anti-seize

Copper-based anti-seize is used in the following locations:

- On threads of Blade Bolts. See **Check Mower Blades** section.
- Between engine crankshaft and pump and blade drive sheaves.

- On clutch arm assembly between bearings and shaft and between lower sheave and shaft.
- Between pump shafts and sheaves.

## Dielectric Grease

Dielectric grease is used on all blade type electrical connections to prevent corrosion and loss of contact.

## Adjustments

**Note:** Disengage PTO, shut off engine, wait for all moving parts to stop, engage parking brake, and remove key before servicing, cleaning, or making any adjustments to the unit.

### ⚠ CAUTION

**Raising the mower deck for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the unit to fall, which could cause injury.**

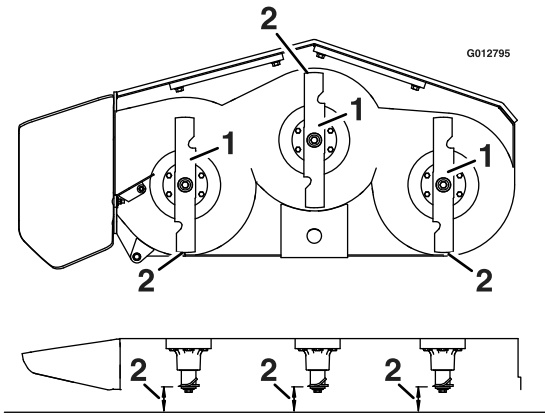
**Do Not rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.**

## Deck Leveling

**Note:** Side to side deck leveling should be done by an Authorized Service Dealer. Small adjustments can be accomplished by increasing the tire pressure in the tire on the low side.

1. Park the machine on a level surface and disengage the blade control switch.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Check the air pressure in the drive tires. If needed, adjust to the recommended inflation; refer to **Checking the Tire Pressure** in Drive System Maintenance section.
4. Set the height of cut lever to the 3 inch (7.6 cm) position.
5. Raise the discharge deflector.
6. Carefully rotate the blades front to rear. Measure from the tip of the front blade to the level surface (Figure 22). The blades should measure 3 inches (7.6 cm).

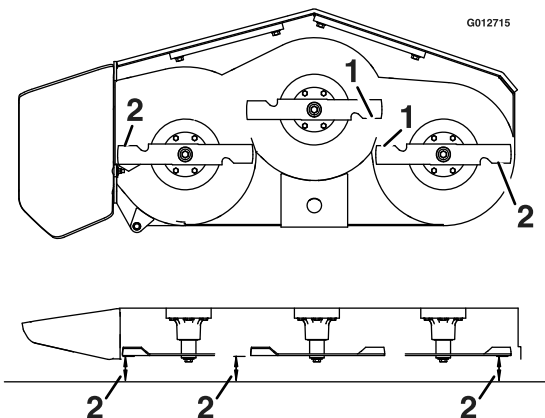
# Maintenance



**Figure 22**

1. Blades front to rear      2. Measure here

7. Measure between the outside cutting edges and the flat surface (Figure 23). If both measurements are not within 3/16 inch (5 mm), an adjustment is required; contact an Authorized Service Dealer.



**Figure 23**

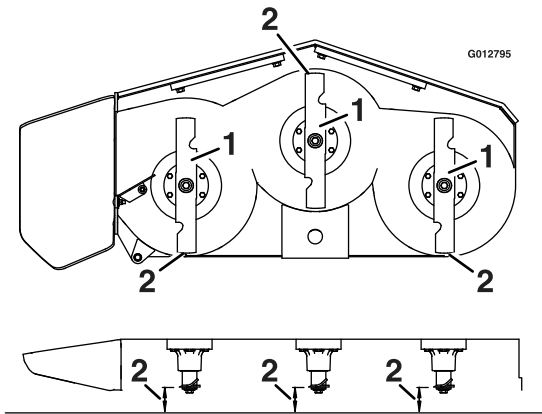
1. Blades side to side      2. Measure here

8. Lower the discharge deflector.

## Adjusting the Cutting Deck Rake

1. Park the machine on a level surface and disengage the blade control switch.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Check the air pressure in the drive tires. If needed, adjust to the recommended inflation; refer to **Checking the Tire Pressure** in Drive System Maintenance section.

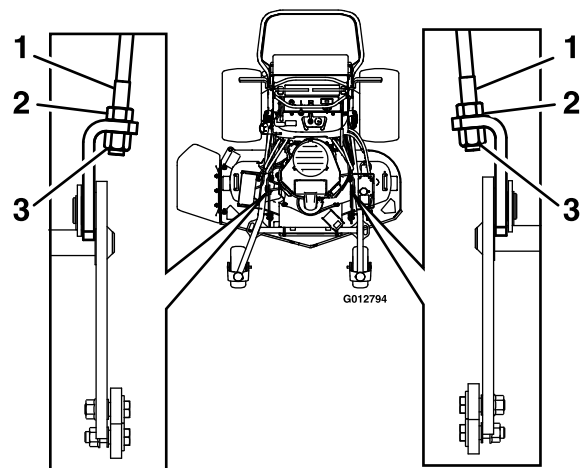
4. Check and adjust the side to side blade level if you have not checked the setting; refer to **Deck Leveling**.
5. Carefully rotate the blades front to rear (Figure 24). Measure from the tip of the front blade to the level surface and the tip of the rear blade to the level surface on all blades. The blades should be 1/4 inch (6.4 mm) lower in the front than in the rear.



**Figure 24**

1. Blades front to rear      2. Measure here

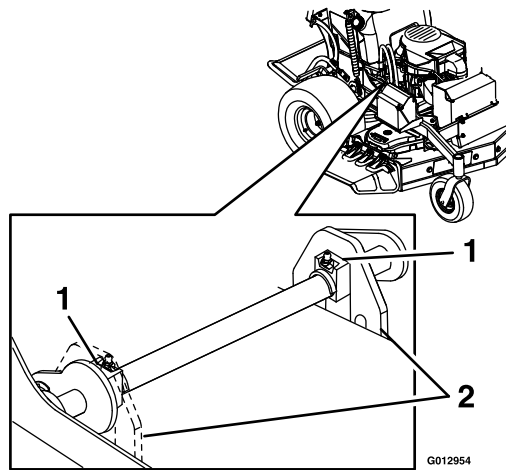
6. Loosen the rear lock nuts on both adjustment rods (Figure 25).



**Figure 25**

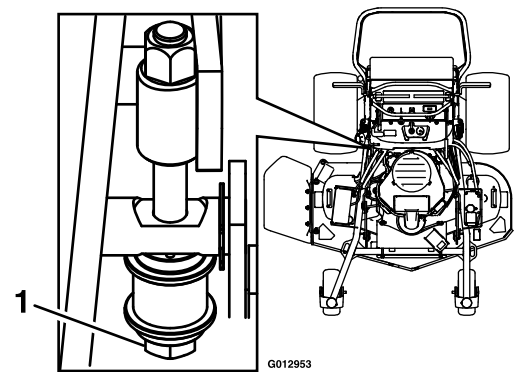
1. Adjustment rod      3. Front lock nut  
2. Rear lock nut

**Note:** Make sure the engine deck brackets are resting firmly on the rear lift points (see Figure 26). If it is lifting off, tighten the front locknut of the adjusting rod on the opposite side.



**Figure 26**

1. Rear lift points
2. Engine deck brackets



**Figure 27**

1. Adjustment screw

7. To raise the front of the mowing deck, tighten the front locking nuts by the same amount on both front adjusting rods. Tighten both rear locking nuts. Check the side to side level of the mower again; refer to **Deck Leveling**.

**Note:** Rake adjustments may affect the motion control neutral position. See the **Motion Control Neutral Adjustment** and **Motion Control Tracking Adjustment** sections in Maintenance.

## Adjusting the Rear of the Deck

1. Park the machine on a level surface and disengage the blade control switch.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Check the air pressure in the drive tires. If needed, adjust to the recommended inflation; refer to **Checking the Tire Pressure** in Drive System Maintenance section.
4. Set the height of cut to the 3 inch (7.6 cm) position.
5. Carefully rotate the blades front to rear. Measure from the tip of the front blade to the level surface. The blades should measure 3 inches (7.6 cm).
6. If it does not measure correctly, locate the height-of-cut rod on the right side of the machine (see Figure 27).

7. Turn the adjustment screw until the blade tips match 3 inches (7.6 cm).

## Pump Drive Belt Tension

Self-tensioning - No adjustment necessary.

## Mower Deck Drive Belt Tension

Self-tensioning - No adjustment necessary.

## Check the Park Brake

1. Park the machine on a level surface.
2. Shut off engine and wait for all moving parts to stop.
3. When the park brake is released, the brake bars should lift off the tires and the hand lever should travel forward to the end of the slot in the control panel. When engaging the brake, the hand lever should travel 3/4 inch (19 mm) at the control panel slot when the brake bars first contact the tire. Measure the gap from the front of the lever to the end of the slot in the control panel when the brake bar contacts the tire.

## Park Brake Adjustment

If the parking brake does not hold securely, an adjustment is required.

1. Park the machine on a level surface.
2. Shut off engine and wait for all moving parts to stop.
3. Disengage the park brake.

# Maintenance

4. To adjust the brake, remove the hairpin, washer, and clevis pin from the lower brake lever and yoke as shown in Figure 28.

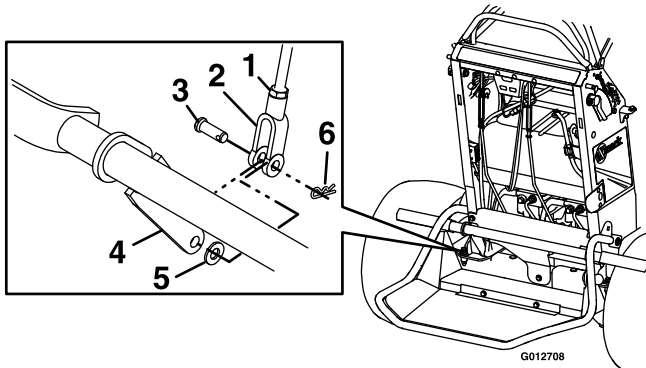


Figure 28

- |               |                      |
|---------------|----------------------|
| 1. Jam nut    | 4. Lower brake lever |
| 2. Yoke       | 5. Washer            |
| 3. Clevis pin | 6. Hairpin           |

5. Loosen the jam nut.
  6. Rotate the yoke. To tighten the brake, rotate the yoke up. To loosen the brake, rotate the yoke down.
- Note:** The brake rod should be threaded into both yokes the same distance.
7. Secure the yoke to lower brake lever with the hairpin, washer, and clevis pin.
  8. Tighten the jam nut.
  9. Check the brake operation again.
  10. After the brake is adjusted, the lever switch needs to be checked.
  11. Check the gap between the brake lever and the switch as shown in Figure 29. The gap needs to be an 1/8 inch (3mm) with the brake engaged.

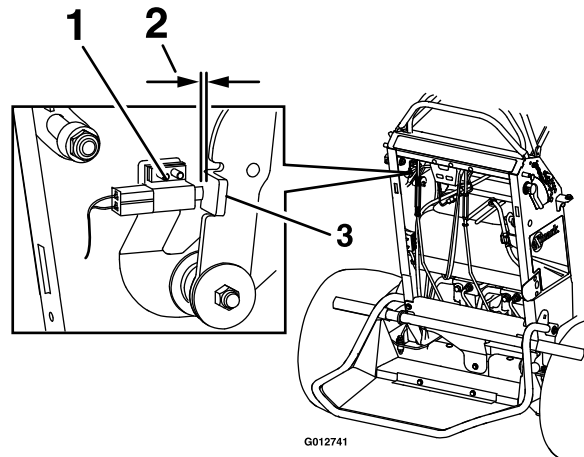


Figure 29

- |   |                |
|---|----------------|
| 1. Switch   | 3. Brake lever |
| 2. 1/8 inch (3mm) gap<br>needed between switch<br>and brake lever |                |

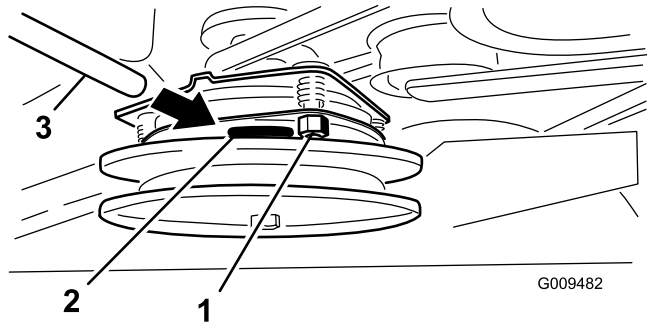
12. If needed, loosen the screws holding the switch and adjust the switch.

## Electric Clutch Adjustment

### Service Interval: Every 100 hours

The clutch is adjustable to ensure proper engagement and proper braking.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake. Allow the machine to cool completely before starting these instructions.
2. Insert a 0.015–0.021 inch (0.381–0.533 mm) feeler gauge through one inspection slot in the side of the assembly. Make sure it is between the armature and the rotor friction surfaces.
3. The gap should be at least 0.015 (0.381 mm) and not more than 0.021 (0.533 mm). If adjustment is needed, then set at 0.015 (0.381 mm) for each of the three adjustment slot positions.
4. Tighten the lock nuts until there is slight binding on the feeler gauge but it can be moved easily within the air gap (see Figure 30).



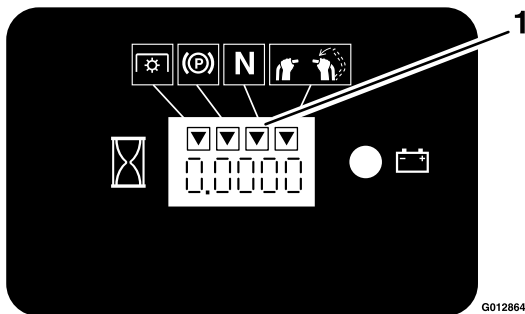
**Figure 30**

- 1. Adjusting nut
- 2. Slot
- 3. Feeler gauge

## Motion Control Neutral Adjustment

Check to see if an adjustment is required:

1. With the engine off, turn the ignition switch to the “ON” position.
2. Locate the LCD indicator in the message display.

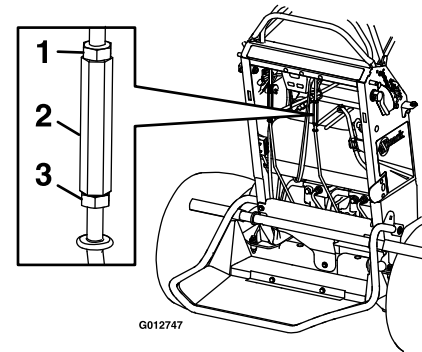


**Figure 31**

- 1. Neutral LCD indicator

3. With the motion control levers in the neutral position (see Figure 4) (with no force on the lever either forward or back), the neutral LCD indicator should appear.
4. If the indicator illuminates, move the RH lever first forward, then backward, noting the position of the control lever when the indicator disappears. The amount of movement, both forward and back, should be approximately the same; if not, go to step 6.
5. If the indicator does not illuminate, move both motion control levers forward and then backward. Continue to watch the message display and note the position of the controls when it appears.

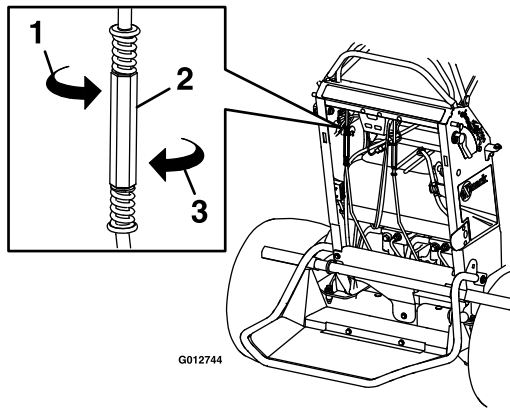
6. Loosen the lock nuts on the turnbuckle on the RH motion control (as viewed from the rear of the machine — see Figure 32). With the right motion control in the PTO disengage position, hold the LH motion control in the position determined in step 4 or 5. Rotate the turnbuckle until the LCD indicator comes on.



**Figure 32**

- 1. Lock nut
- 2. Turnbuckle
- 3. Lock nut (LH thread)

7. Continue to rotate the turnbuckle, counting the turns, until the LCD indicator turns off. Rotate the turnbuckle in the opposite direction half the number of turns counted. Release the LH motion control lever and tighten the lock nuts on the right side.
8. Adjust the turnbuckle on the LH side (as viewed from the rear of the machine — see Figure 33) until the left control has approximately the same natural neutral position as the right. If more adjustment is needed, contact an Authorized Service Dealer. Final adjustment of the left side is done in the tracking adjustment section. If no adjustment is required, see **Check the Neutral Switch Alignment** section.



**Figure 33**

1. Rotate to increase speed
2. Turnbuckle
3. Rotate to decrease speed

9. Reinstall the rear cushion.

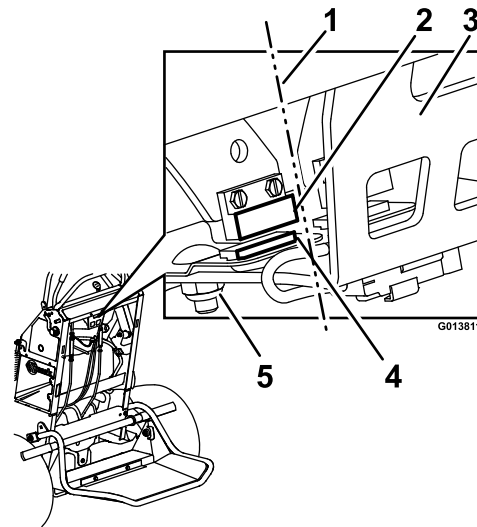
## Motion Control Tracking Adjustment

If the machine travels or pulls to one side when the motion control levers are in the full forward position, adjust the tracking.

1. Push both control levers forward the same distance.
2. Check if the machine pulls to one side. If it does, stop the machine and set the parking brake.
3. Release the rear cushion from the rear of the machine.
4. Place the front reference/speed control bar in the maximum forward position. See **Adjusting the Front Reference/Speed Control Bar in Operation**.
5. Rotate the turnbuckle on the LH side of the machine (as viewed from the rear of the machine — see Figure 33).
6. Looking down towards the turnbuckle — rotate it counterclockwise, in 1/4 turn increments, to increase speed or clockwise to decrease speed.
7. Drive the machine and check the full forward tracking.
8. Repeat steps 5 through 7 until desired tracking is obtained.
9. Reinstall the rear cushion.

## Check the Neutral Switch Alignment

1. Park the machine on a level surface and disengage the blade control switch.
2. Stop engine, wait for all moving parts to stop, and remove the key or spark plug wire(s).
3. Set the height of cut to the 3 inch (7.6 cm) position.
4. Perform the **Motion Control Neutral Adjustment** and **Motion Control Tracking Adjustment** as stated in the Maintenance section.
5. Release the rear cushion from the rear of the machine and lower to the platform.
6. Check the alignment on the LH and RH neutral switches upper and lower surfaces (reference Figure 34). If they are not in alignment, loosen the hardware on the lower neutral switch and adjust it forward or rearward as necessary. Once aligned, tighten the hardware. Check the neutral switch alignment again as the deck is moved through the highest and lowest cut height setting; adjust the lower neutral switch surface if necessary.



**Figure 34**

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1. Alignment reference          | 4. Lower neutral switch surface |
| 2. Upper neutral switch surface | 5. Hardware                     |
| 3. Switch mounting plate        |                                 |

7. Adjust the upper neutral switch surface left or right if side-to-side alignment is needed. The upper and lower switches should be as



close together as possible without touching (approximately .06 inch (1.5 mm) gap is desirable). The switch mounting plate can be moved up or down to adjust the position of the lower neutral switch.

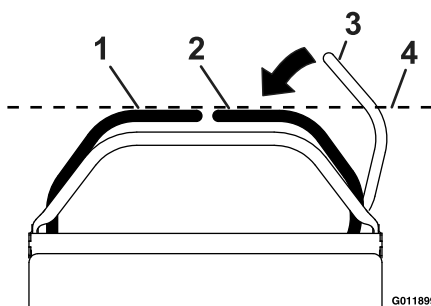
8. Check the function of the neutral switches by temporarily replacing the key. With the engine off, turn the ignition switch to the "ON" position. Locate the LCD indicator in the message display. Raise and lower the deck.
  - A. If the indicator displays while moving the deck up and down, the neutral switches have been adjusted properly and no further adjustment is necessary.
  - B. If the indicator does not stay lit while moving the deck up and down, contact an Authorized Service Dealer. Remove the key.

## Adjust RH Motion Control Handle Position

If the motion control levers do not align horizontally, adjust the right side motion control lever.

**Note:** Adjust the horizontal alignment before the front to back alignment.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Push the right motion control lever down out of locked neutral position.
3. Check if it aligns horizontally with the left motion control lever.

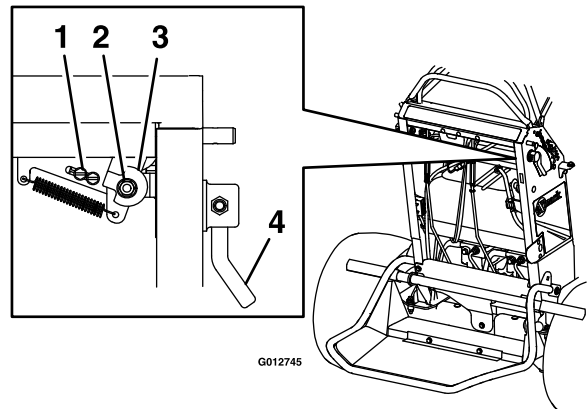


**Figure 35**

1. LH Motion control lever
2. RH Motion control lever
3. RH Motion control lever in PTO disengaged position
4. Check the horizontal alignment here

4. To adjust the right motion control lever horizontally, the cam needs to be adjusted.

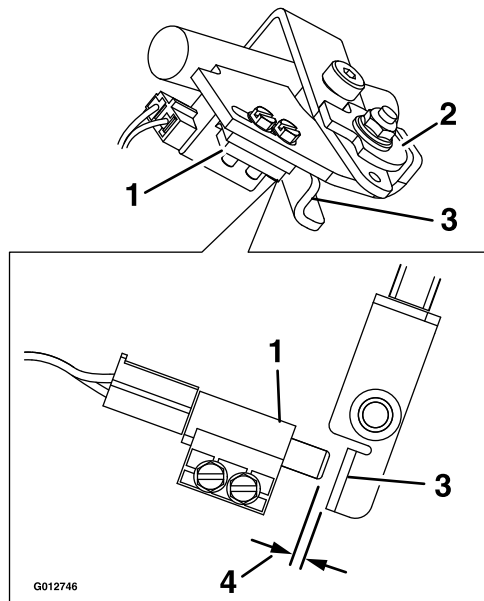
5. Release the cushion from the rear of the machine.
6. Loosen the nut and bolt holding the cam.
7. Adjust the cam until it aligns with the left motion control lever and tighten the nut and bolt for the cam.



**Figure 36**

1. Switch screws
2. Nut and bolt
3. Cam
4. Front reference/speed control handle

8. After the cam is adjusted, the lever switch needs to be checked.
9. Check the gap between the control lever and switch as shown in Figure 37. The gap needs to be an 1/8 inch (3mm) with the right motion control lever in the neutral, operate position.



**Figure 37**

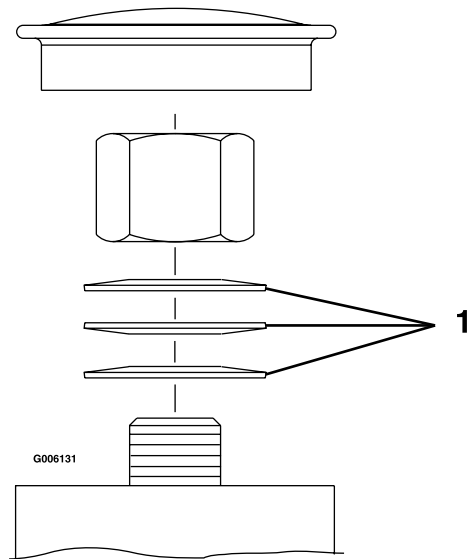
1. Switch
2. Cam
3. Right motion control lever in the neutral operate position
4. 1/8 inch (3mm)

10. If needed, loosen the screws holding the switch and adjust the switch.

11. Tighten the switch screws.

## Caster Pivot Bearings Pre-Load Adjustment

Remove dust cap from caster and tighten nyloc nut until washers are flat and back off 1/4 of a turn to properly set the pre-load on the bearings. If disassembled, make sure the spring disc washers are reinstalled as shown in Figure 38.



**Figure 38**

1. Spring disc washers
-

## Cleaning

### Clean Engine and Exhaust System Area

**Service Interval: Before each use or daily (May be required more often in dry or dirty conditions.)**

#### **⚠ CAUTION**

Excessive debris around engine cooling air intake and exhaust system area can cause engine, exhaust area, and hydraulic system to overheat which can create a fire hazard.

Clean all debris from engine and exhaust system area.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Clean all debris from rotating engine air intake screen, around engine shrouding, and exhaust system area.
3. Wipe up any excessive grease or oil around the engine and exhaust system area.

### Remove Engine Shrouds and Clean Cooling Fins

**Service Interval: Every 80 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove cooling shrouds from engine and clean cooling fins. Also clean dust, dirt, and oil from external surfaces of engine which can cause improper cooling.
3. Make sure cooling shrouds are properly reinstalled. Operating the engine without cooling shrouds will cause engine damage due to overheating.

### Clean Debris From Machine

**Service Interval: Before each use or daily**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Clean off any oil, debris, or grass build-up on the machine and cutting deck, especially under deck belt shields, around the fuel tank, around engine and exhaust area.

### Clean Grass Build-Up Under Deck

**Service Interval: Before each use or daily**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Raise deck to the transport (maximum cutting height) position. Lift the front of unit and support unit using jack stands or equivalent support.

#### **⚠ CAUTION**

Raising the mower deck for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the unit to fall, which could cause injury.

Do Not rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.

3. Clean out any grass build-up from underside of deck and in discharge deflector.

## Waste Disposal

### Motor Oil Disposal

Engine oil and hydraulic oil are both pollutants to the environment. Dispose of used oil at a certified recycling center or according to your state and local regulations.

## Battery Disposal

### **DANGER**

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns. Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- **Wear safety glasses to shield eyes, and rubber gloves to protect skin and clothing when handling electrolyte.**
- **Do Not swallow electrolyte.**
- **In the event of an accident, flush with water and call a doctor immediately.**

Federal law states that batteries should not be placed in the garbage. Management and disposal practices must be within relevant federal, state, or local laws.

If a battery is being replaced or if the unit containing the battery is no longer operating and is being scrapped, take the battery to a local certified recycling center. If no local recycling is available return the battery to any certified battery reseller.

## Troubleshooting

**Important:** It is essential that all operator safety mechanisms be connected and in proper operating condition prior to mower use.

When a problem occurs, do not overlook the simple causes. For example: starting problems could be caused by an empty fuel tank.

The following table lists some of the common causes of trouble. Do Not attempt to service or replace major items or any items that call for special timing of adjustments procedures (such as valves, governor, etc.). Have this work done by your **Engine Service Dealer**.

**Note:** When disconnecting electrical connectors Do Not pull on the wires to separate the connectors.

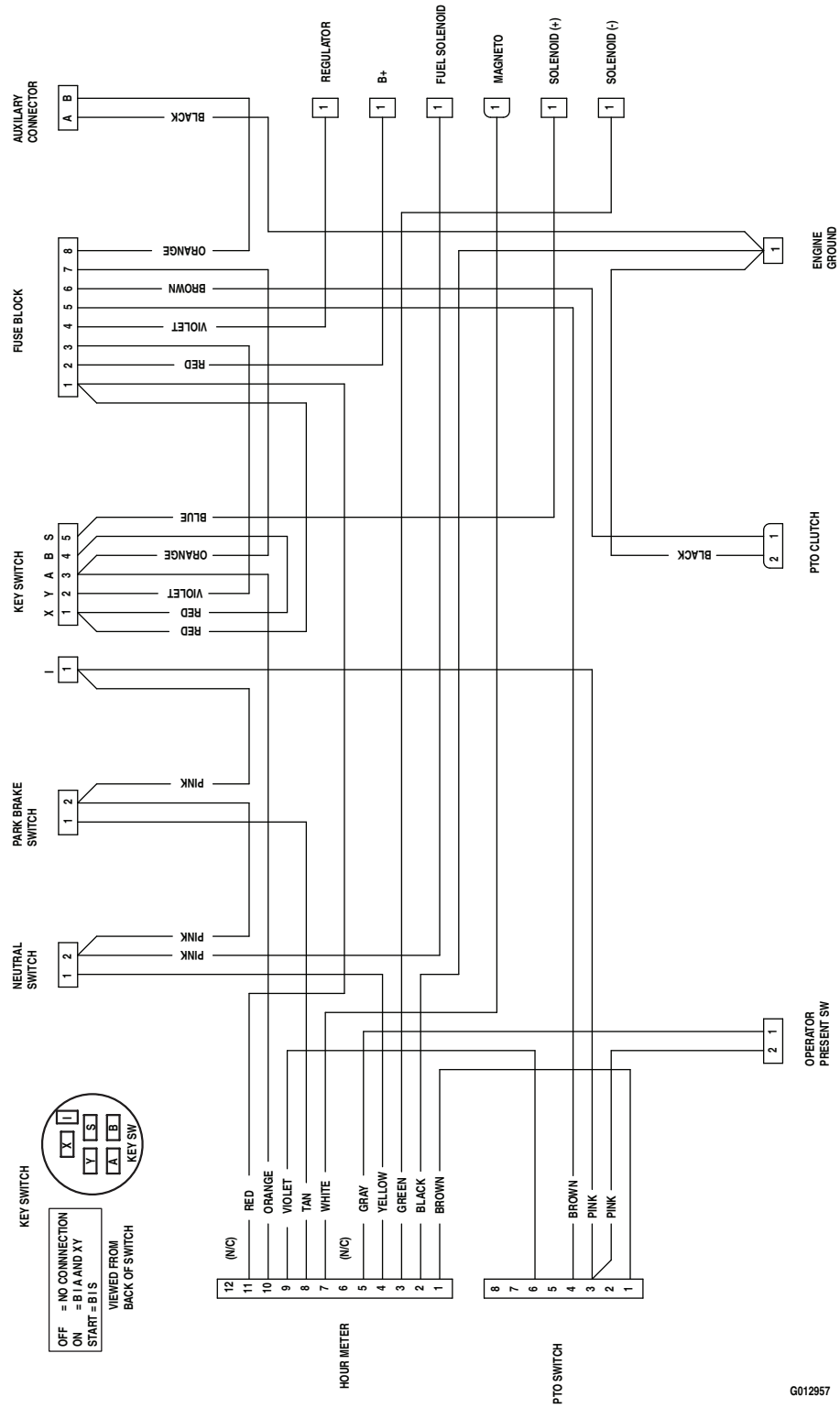
Problem	Possible Cause	Corrective Action
Starter does not crank.	<ol style="list-style-type: none"> <li>1. PTO is engaged.</li> <li>2. One of the speed control levers are not in neutral position.</li> <li>3. Battery does not have a full charge.</li> <li>4. Electrical connections are corroded, loose or faulty.</li> <li>5. Fuse is blown.</li> <li>6. Neutral LCD indicator does not illuminate.</li> <li>7. Relay or switch is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disengage the PTO.</li> <li>2. Ensure the speed control lever is in the neutral position.</li> <li>3. Charge the battery. See <b>Check Battery Charge</b> and <b>Recommended Jump Starting Procedure</b> sections in Maintenance.</li> <li>4. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect.</li> <li>5. Replace the blown fuse.</li> <li>6. Check reed switch.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
Engine will not start, starts hard, or fails to keep running.	<ol style="list-style-type: none"> <li>1. Fuel tank is empty.</li> <li>2. Fuel shutoff valve is closed.</li> <li>3. The throttle and choke are not in the correct position.</li> <li>4. Dirt in fuel filter.</li> <li>5. Dirt, water, or stale fuel is in the fuel system.</li> <li>6. Air cleaner is dirty.</li> <li>7. Electrical connections are corroded, loose or faulty.</li> <li>8. Relay or switch is defective.</li> <li>9. Faulty spark plug.</li> <li>10. Spark plug wire is not connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill the fuel tank.</li> <li>2. Open the fuel shutoff valve.</li> <li>3. Be sure the throttle control is midway between the "SLOW" and "FAST" positions, and the choke is in the "ON" position for a cold engine or the "OFF" position for a warm engine.</li> <li>4. Replace the fuel filter.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Clean or replace the air cleaner element.</li> <li>7. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect.</li> <li>8. Contact an Authorized Service Dealer.</li> <li>9. Clean, adjust or replace spark plug.</li> <li>10. Check the spark plug wire connection.</li> </ol>
Engine loses power.	<ol style="list-style-type: none"> <li>1. Engine load is excessive.</li> <li>2. Air cleaner is dirty.</li> <li>3. Oil level in the crankcase is low.</li> <li>4. Cooling fins and air passages for the engine are plugged.</li> <li>5. Vent hole in the fuel cap is plugged.</li> <li>6. Dirt in fuel filter.</li> <li>7. Dirt, water, or stale fuel is in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Clean or replace the air cleaner element.</li> <li>3. Add oil to the crankcase.</li> <li>4. Remove the obstructions from the cooling fins and air passages.</li> <li>5. Clean or replace the fuel cap.</li> <li>6. Replace the fuel filter.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>

# Troubleshooting

Problem	Possible Cause	Corrective Action
Engine overheats.	<ol style="list-style-type: none"> <li>1. Engine load is excessive.</li> <li>2. Oil level in the crankcase is low.</li> <li>3. Cooling fins and air passages for the engine are plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Add oil to the crankcase.</li> <li>3. Remove the obstructions from the cooling fins and air passages.</li> </ol>
Mower pulls left or right (with levers fully forward).	<ol style="list-style-type: none"> <li>1. Tire pressure in drive tires not correct.</li> <li>2. Tracking needs adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust tire pressure in the drive tires.</li> <li>2. Adjust the tracking by turning turnbuckle on the LH turnbuckle in the direction that the mower needs to be adjusted to. Rotate the turnbuckle in 1/4 turn increments until the mower tracks correctly.</li> </ol>
Machine does not drive.	<ol style="list-style-type: none"> <li>1. Bypass valve is not closed tight.</li> <li>2. Drive or pump belt is worn, loose or broken.</li> <li>3. Drive or pump belt is off a pulley.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the bypass valve.</li> <li>2. Change the belt.</li> <li>3. Change the belt.</li> </ol>
Uneven cutting height.	<ol style="list-style-type: none"> <li>1. Blade(s) not sharp.</li> <li>2. Cutting blade(s) is/are bent.</li> <li>3. Mower deck is not level.</li> <li>4. Underside of mower is dirty.</li> <li>5. Tire pressure in drive tires not correct.</li> <li>6. Blade spindle bent.</li> <li>7. Tips of adjacent blades are at an uneven cutting height. Blades tips should be even within 3/16 inch which is approximately one blade thickness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen the blade(s).</li> <li>2. Install new cutting blade(s).</li> <li>3. Level mower deck from side-to-side and front-to-rear.</li> <li>4. Clean the underside of the mower.</li> <li>5. Adjust tire pressure in the drive tires.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Replace blades, spindles and (or) check for damage to mower deck.</li> </ol>
Abnormal vibration.	<ol style="list-style-type: none"> <li>1. Cutting blade(s) is/are bent or unbalanced.</li> <li>2. Blade mounting bolt is loose.</li> <li>3. Engine mounting bolts are loose.</li> <li>4. Loose engine pulley, idler pulley, or blade pulley.</li> <li>5. Engine pulley is damaged.</li> <li>6. Blade spindle is bent.</li> <li>7. Belt is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install new cutting blade(s).</li> <li>2. Tighten the blade mounting bolt.</li> <li>3. Tighten the engine mounting bolts.</li> <li>4. Tighten the appropriate pulley.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Install new belt.</li> </ol>
Blades do not rotate.	<ol style="list-style-type: none"> <li>1. Drive belt is off pulley.</li> <li>2. Deck belt is worn, loose or broken.</li> <li>3. Deck belt is off pulley.</li> <li>4. Broken or missing idler spring.</li> <li>5. Electric clutch out of adjustment.</li> <li>6. Damaged electric clutch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check belt for damage; replace if necessary. Install drive belt and check adjusting shafts and belt guides for correct position.</li> <li>2. Install new deck belt.</li> <li>3. Install deck pulley and check the idler pulley, idler arm and spring for correct position and function.</li> <li>4. Replace the spring.</li> <li>5. Adjust the clutch air gap.</li> <li>6. Contact an Authorized Service Dealer.</li> </ol>

# Schematics

## Electrical Diagram

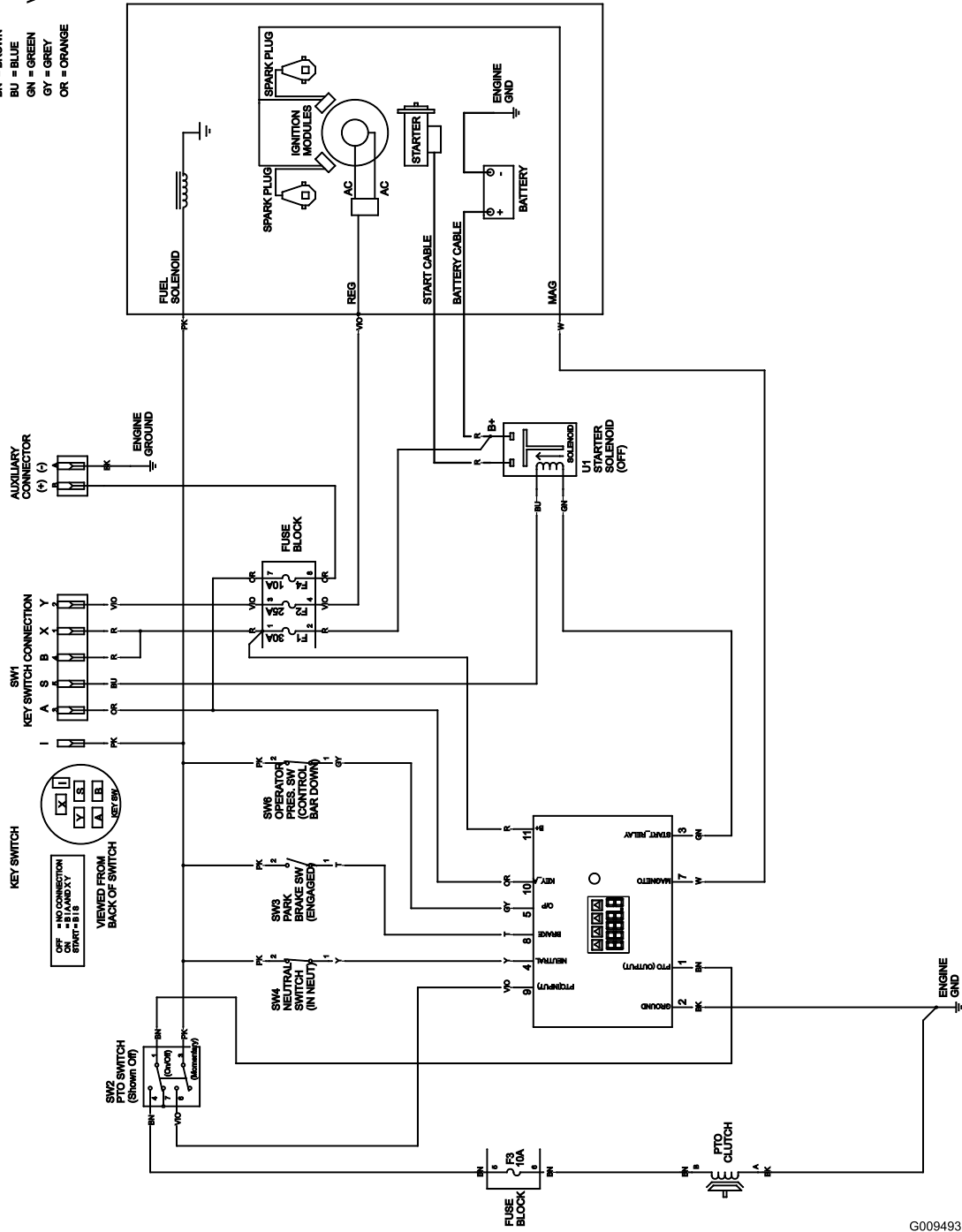


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## Electrical Schematic

**WIRE COLOR CODES**

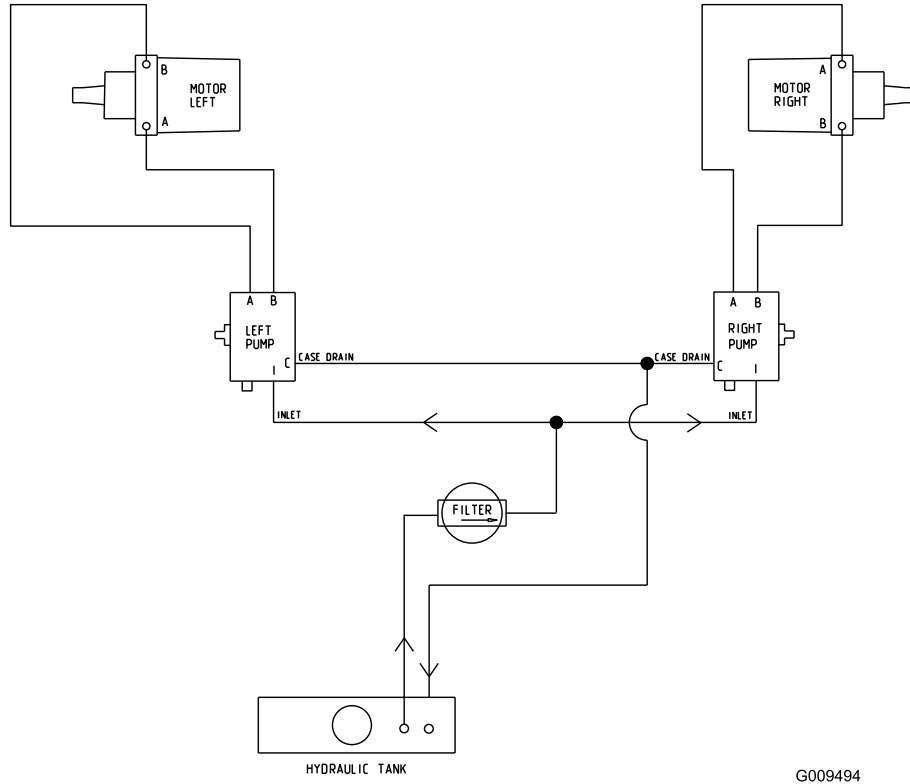
BK = BLACK	PK = PINK
BN = BROWN	R = RED
BU = BLUE	T = TAN
GN = GREEN	VIO = VIOLET
GY = GREY	W = WHITE
OR = ORANGE	Y = YELLOW



G009493



### Hydraulic Diagram



G009494

# Exmark Lazer Z, Lazer Z Advantage Series X, and Vantage Turf Equipment 3 Year Limited Commercial Warranty 5 Year or 750 Hours Limited Consumer Warranty

## General Warranty Conditions and Products Covered

Exmark Mfg. Co. Inc. and its affiliate, Exmark Warranty Company, pursuant to an agreement between them, jointly warrant on the terms and conditions herein, that we will repair, replace or adjust any part on these products and found by us (in the exercise of our reasonable discretion) to be defective in factory materials or workmanship.

This warranty may only be assigned or transferred to a second (or third) owner by an authorized Exmark dealer. The warranty period commences upon the date of the original retail purchase.

### Commercial Warranty Conditions

This warranty applies to Exmark Lazer Z, Lazer Z Advantage Series (AS) X, and Vantage turf equipment sold in the U.S. or Canada for a period of three years for commercial usage.

This warranty includes the cost of parts and labor for a period of two years and the cost of parts for one additional year. This warranty does not cover pickup and delivery charges to and from any authorized Exmark Service Dealer.

### Consumer Warranty Conditions

This warranty applies to Exmark Lazer Z, Lazer Z AS X, and Vantage turf equipment sold in the U.S. or Canada for a period of five years or 750 hours (whichever occurs first) for residential usage.

Residential usage means use of the product on the same lot as your home. Use at more than one location is considered commercial use, and the commercial use warranty detailed above would apply.

This warranty only includes the cost of parts and labor. For the first warrantable service repair, Exmark will cover up to \$45 for associated pick-up and delivery charges to and from any authorized Exmark Service Dealer. Additional transportation charges may apply, contact your Dealer for details.

### Warranty Exceptions

<u>Warranty Exceptions</u>	<u>Warranty Period</u>
• Bags, Belts and Tires	90 days
• Battery	1 Year Prorated
• Engine (except Kohler EFI)	2 years*
• Kohler EFI Engine	3 years*

\* The Engine warranty is covered by the engine manufacturer. Please refer to the engine manufacturer's warranty statement that is included in the literature packet.

### Items and Conditions Not Covered

This warranty does not cover the following:

- Any damage or deterioration due to normal use, wear and tear, or exposure.
- Cost of regular maintenance service or parts, such as filters, fuel, lubricants, tune-up parts, and adjustments.
- Any product or part which has been altered or misused or required replacement or repair due to normal wear, accidents, or lack of proper maintenance.
- Any repairs necessary due to use of parts, accessories or supplies, including gasoline, oil or lubricants, incompatible with the turf equipment or other than as recommended in the operator's manual or other operational instructions provided by Exmark.

There are no other express warranties except for engine and special emission system coverage.

All warranty work must be performed by an authorized Exmark Service Dealer using Exmark approved replacement parts.

## Instructions for Obtaining Warranty Service

The product must be registered with original proof of purchase by an Exmark Service Dealer before obtaining any warranty service.

Contact any Exmark Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, access our website at [www.exmark.com](http://www.exmark.com). U.S. or Canada customers may also call 402-223-6375.

If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:

Exmark Customer Service Department  
The Exmark Warranty Company  
2101 Ashland Avenue  
Beatrice, NE 68310  
402-223-6375 or  
[service@exmark.com](mailto:service@exmark.com)

## Owner's Responsibilities

If your product requires warranty service it must be returned to an authorized Exmark service dealer within the warranty period. This warranty extends only to turf equipment operated under normal conditions. You must read the operator's manual. You must also properly service and maintain your Exmark product as described in the operator's manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense.

## General Conditions

The sole liability of Exmark and Exmark Warranty Company with respect to this warranty shall be repair or replacement of defective components as set forth herein. **Neither Exmark nor Exmark Warranty Company shall be liable for any incidental or consequential loss or damage.**

Such damages include but are not limited to:

- Expenses related to gasoline, oil or lubricants.
- Travel time, overtime, after hours time or other extraordinary repair charges or charges relating to repairs or replacements outside of normal business hours at the place of business of the authorized Exmark Service Dealer.
- Rental of like or similar replacement equipment during the period of any warranty, repair or replacement work.
- Any telephone or telegram charges or travel charges.
- Loss or damage to person or property other than that covered by the terms of this warranty.
- Any claims for lost revenue, lost profit or additional cost as a result of a claim of breach of warranty.
- Attorney's fees.

No Claim of breach of warranty shall be cause for cancellation or rescission of the contract of sale of any Exmark mower.

**All implied warranties of merchantability (that the product is fit for ordinary use) and fitness for use (that the product is fit for a particular purpose) are limited to the duration of the express warranty.**

**Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.**

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

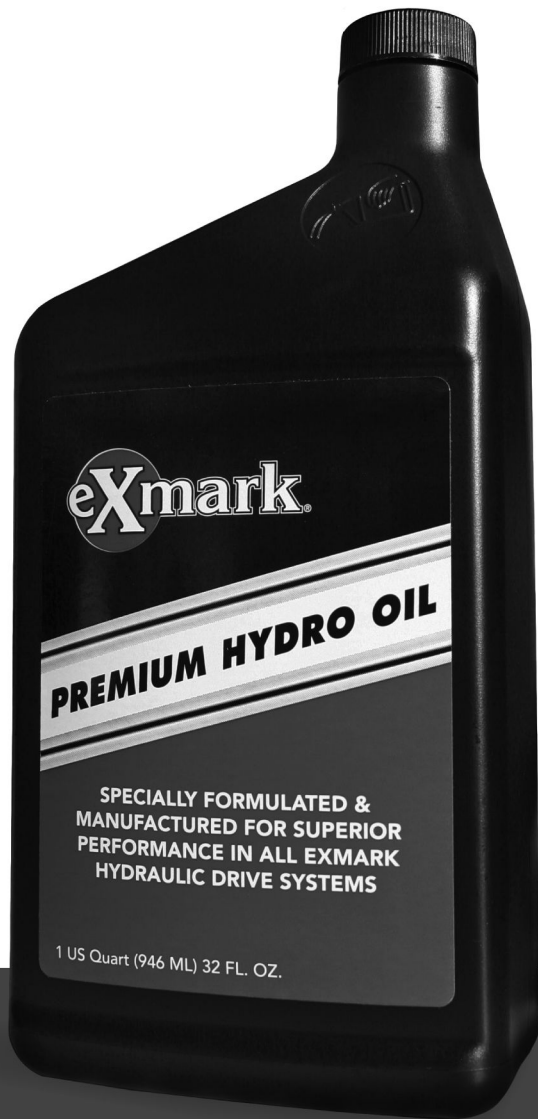
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**Notes:**

**Notes:**



# NEW EXMARK PREMIUM HYDRO OIL



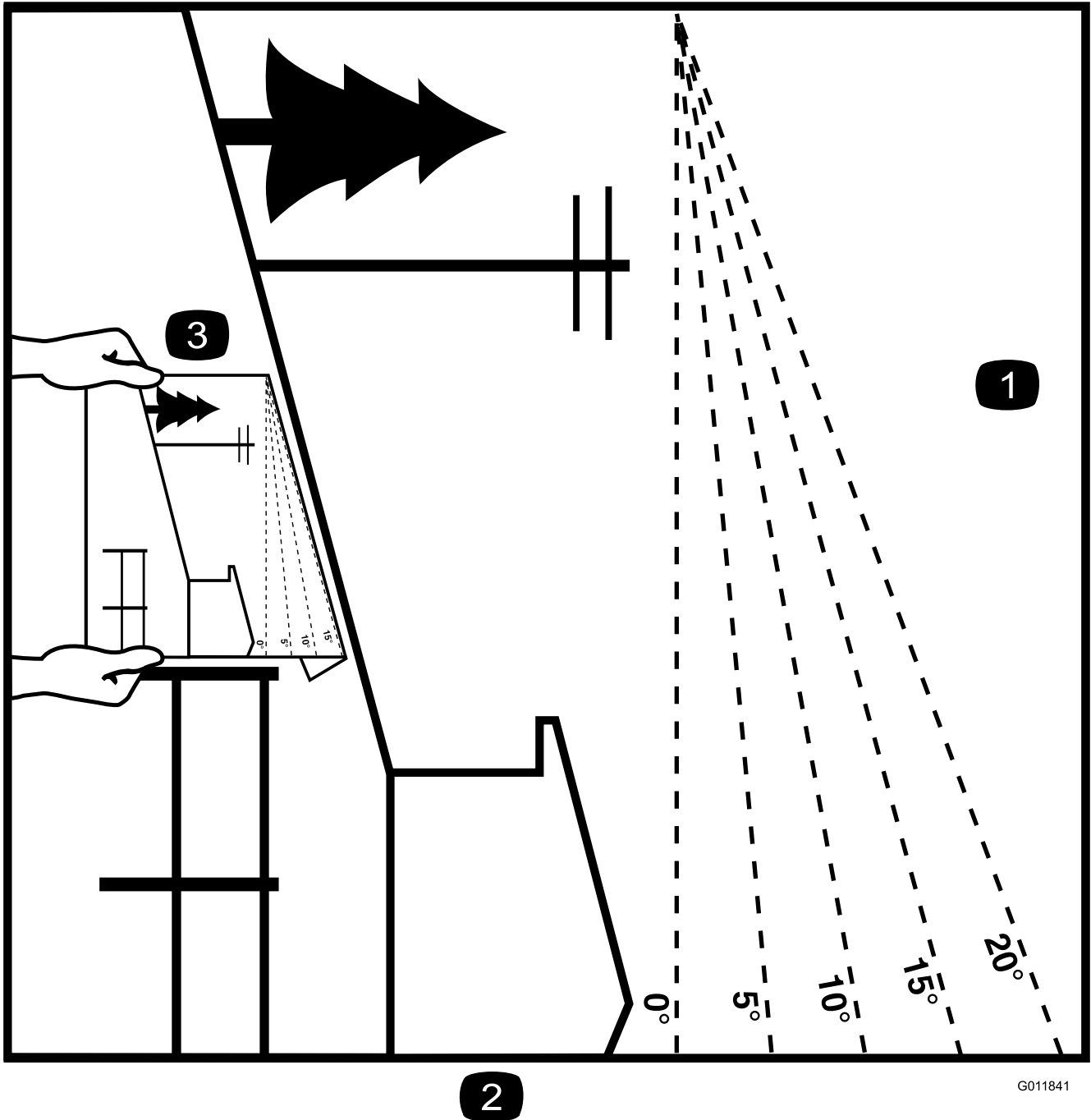
## BENEFITS

- Designed & manufactured with superior anti-wear protection
- Superior thermal stability
- Consistent hydro performance
- Superior shear resistance under heavy loads
- Field tested & proven performance
- Twice the shear stability of competing oils
- Enhanced control performance
- Specially formulated for any Exmark hydraulic system

**NOW AVAILABLE  
FOR PURCHASE**

Part No. 109-9828





G011841

2

Figure 39

This page may be copied for personal use.

1. The maximum slope you can safely operate the machine on is **20 degrees**. Use the slope indicator to determine the degree of slope of hills before operating. **Do Not operate this machine on a slope greater than 20 degrees.** Fold along the appropriate line to match the recommended slope.
2. Align this edge with a vertical surface, a tree, building, fence pole, etc.
3. Example of how to compare slope with folded edge.

## SEE EXMARK'S COMPLETE LINE OF ACCESSORIES AND OPTIONS

### MID-MOUNT RIDING ACCESSORIES AND OPTIONS

CUSTOM RIDE SEAT SUSPENSION SYSTEM	OPERATOR CONTROLLED DISCHARGE
FULL SUSPENSION SEAT	ROLL OVER PROTECTION SYSTEM (ROPS)
DECK LIFT ASSIST KIT	SUN SHADE
HITCH KIT	TRASH CONTAINER
LIGHT KIT	TURF STRIPER
12V POWER PORT	ULTRA VAC COLLECTION SYSTEM
MICRO-MULCH SYSTEM	ULTRA VAC QUICK DISPOSAL SYSTEM

### OUT-FRONT RIDING ACCESSORIES AND OPTIONS

CUSTOM RIDE SEAT SUSPENSION SYSTEM	SNOW BLADE
DUAL-TAIL WHEEL	SNOWBLOWER
FLOOR PAN EXTENDER	SUN SHADE
HITCH KIT	TRASH CONTAINER
LIGHT KIT	ULTRA VAC COLLECTION SYSTEM
MICRO-MULCH SYSTEM	ULTRA VAC QUICK DISPOSAL SYSTEM
ROLL OVER PROTECTION SYSTEM (ROPS)	WEATHER CAB

### WALK-BEHIND ACCESSORIES AND OPTIONS

GRASS CATCHER	TURF STRIPER
MICRO-MULCH SYSTEM	STANDON

Place Model No. and Serial No.  
Label Here (Included in the Literature  
Pack) or Fill in Below

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date Purchased \_\_\_\_\_

Engine Model No. and Spec. No. \_\_\_\_\_

Engine Serial No. (E/No) \_\_\_\_\_

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